

MINING WORLD



in this issue

Manganese Inc. Rebuilds Plant

Page 46



BOX HOLE LOADING with Eimcos has been tried in Canada with faster development and lower production costs. Many mines are considering changing to mechanical production loading 100% — best results have been in operations using Eimco loading equipment exclusively.

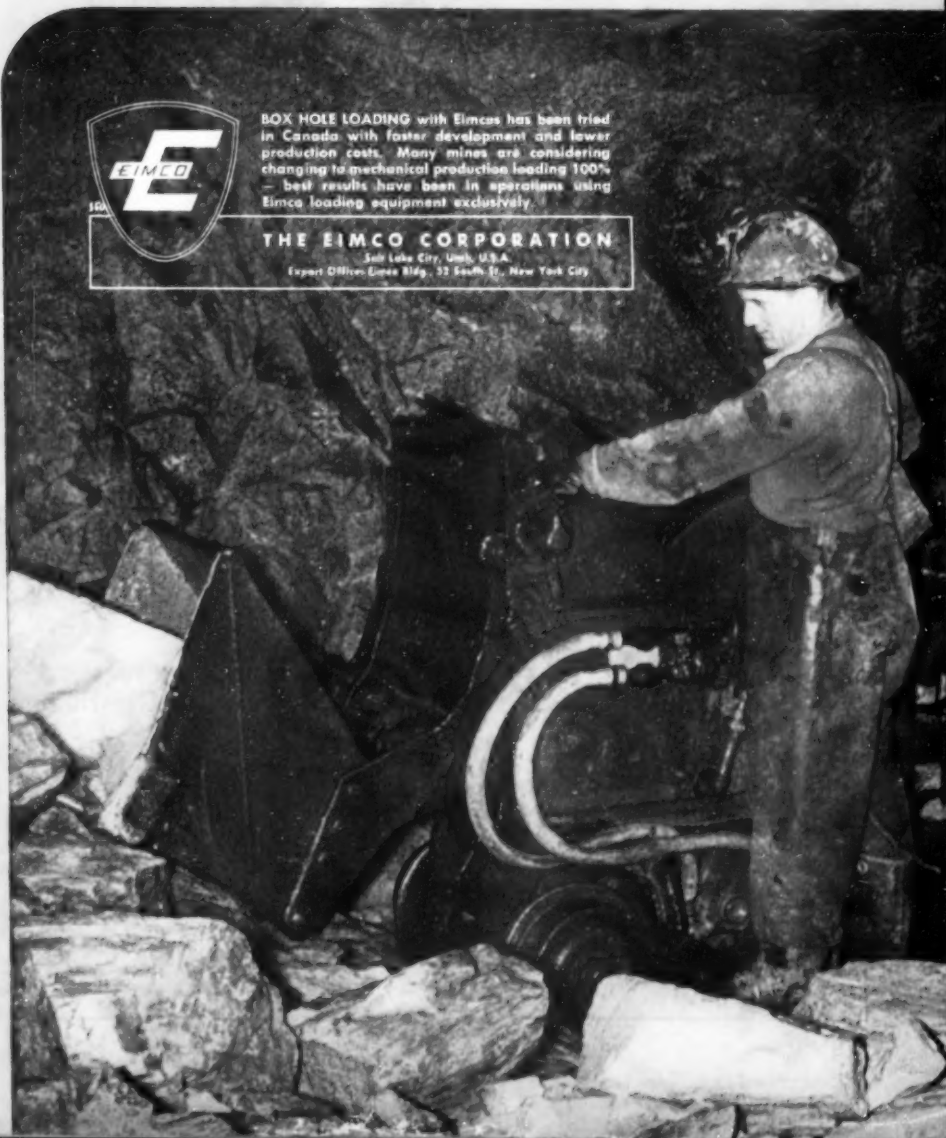
THE EIMCO CORPORATION

Salt Lake City, Utah, U.S.A.
Export Office: Linco Bldg., 32 South St., New York City

JUNE, 1954

Vol. 16 No. 7

35 cents a copy
in sterling 3s



29 in 3 YEARS!

SUPERIOR Gyratory CRUSHERS



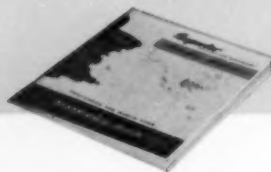
SUPERIOR primary and secondary gyratory crushers have been making a big name for themselves since they were introduced three years ago. Twenty-six are installed and operating . . . three are under construction now, including a huge 60 x 109 machine — largest crusher the world has ever known.

A policy of simplifying design and controlling quality has made Allis-Chalmers the leading builder of crushers. A continuing policy of *improving* crusher design has greatly extended this leadership.

This vast backlog of crusher application experience — over 75 years of it — is always available to you when you want to make sure of a successful installation. Allis-Chalmers, Milwaukee 1, Wisconsin.

Superior is an Allis-Chalmers trademark.

A-4319



NEW 32-Page Book Contains Helpful Crushing Data

● Packed with factual "how to" information on figuring hp requirements, impact and compressive strengths.

● Step-by-step procedures for estimating gyratory crusher sizes, capacities. Examples are worked out.

● Many other valuable facts on gyratory crusher operation . . . application . . . engineering.

It's a book you'll want to have and keep!

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Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.



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COPPER!



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"THE PRIDE OF THE PIT"

Since July 1952 at Anaconda's new mine in Nevada, four 5-yard P&H Model 1500 Electric Shovels have been stripping overburden and copper ore on a 24-hour schedule, 6 days a week. Average production for each machine is 7,000 tons per 8-hour shift, as the Yerington mines ore production reaches 11,000 tons per day. Much of this digging has been done in ground without resorting to blasting.

It's the kind of digging where P&H performance shows up such advanced features as all-welded construction, Magnetorque® hoist, independent propel, powerful worm crowd, stepless control. Remember, too, that P&H electrical equipment is designed and built for shovel service.

Steady, dependable production at low tonnage cost — that's the reason why every third P&H Electric Shovel sold is a repeat order. Get the facts. Ask us to send Bulletin X-139.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P-H LARGE EXCAVATOR DIVISION

HARNISCHFEGER CORPORATION

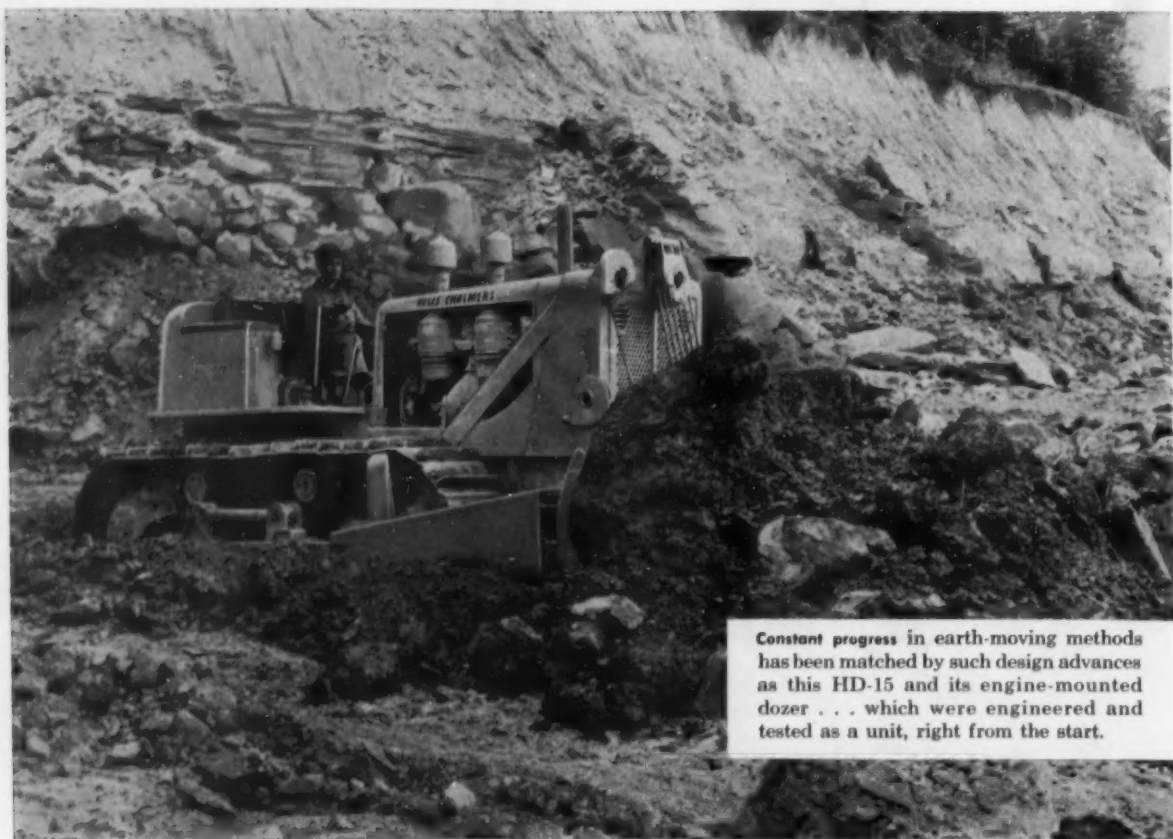
MILWAUKEE 46, WISCONSIN



JUNE, 1954

[World Mining Section—1]

1



Constant progress in earth-moving methods has been matched by such design advances as this HD-15 and its engine-mounted dozer . . . which were engineered and tested as a unit, right from the start.

Help for Mine Operators on the cost sheet...and on the job

IN the past 15 to 20 years, the mining industry has kept stripping and output costs down in spite of rising labor and material costs. To do it, mine operators have pioneered new earth-moving techniques that have put constantly increasing demands on machinery. That's why in today's tough competitive era, mining requires modern, versatile equipment that enables the mine operator to increase output per man-hour and work at a profit.

In an effort to cooperate fully to meet these demands, Allis-Chalmers has for years geared its progress to that of the mine operator himself . . . now offers him completely new designs like the HD-15 . . . a machine that takes advantage of even the most recent developments in tractor application.

The design of the HD-15 also makes full use of

new metals, new oils and greases, and the latest manufacturing processes. Existing models were not allowed to restrict Allis-Chalmers engineers . . . so they worked right from the ground up, matching part to part, assembly to assembly, and the entire tractor to its allied equipment. As a result, the HD-15 offers new standards in ease of operation and service, as well as long-life performance. With outstanding balance characteristics, it handles both mounted and drawn equipment well, provides maximum flexibility for the wide variety of jobs.

We invite you to talk with your nearby Allis-Chalmers dealer to compare values . . . see for yourself how the HD-15 can be a big factor in helping you to increase output per man and hold costs in line.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U.S.A.

HD-15

109 drawbar hp.
17,850 lb.
Six speeds forward to 5.8 mph.
Three reverse speeds to 4.5 mph.

MINING WORLD

**MINING
OPERATORS**

**USE
McCarthy
Drills**



**Heavy-
Rugged
Powerful**

At Bessemer Limestone & Cement Co., Bessemer, Pa., one McCarthy unit (above) averages 90 ft. per hour, drilling through hard blue shale and sand rock 34 ft. deep. Blast holes are drilled on 18-ft. centers. Two men handle the whole job, including setup and moving. McCarthy drills operate with gasoline, diesel or electric power units . . . on all types of mounts. McCarthy "money-savers" can work for you. See your nearby distributor or write Salem Tool direct for further information.



THE SALEM TOOL CO.
801 S. ELLSWORTH AVE.
SALEM, OHIO · U. S. A.

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Including the Export Edition WORLD MINING

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VOLUME 16

JUNE 1954

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COVER CIRCLE: Euclid truck dumps ore reclaimed from blending pile at Manganese Inc.'s mill east of Henderson, Nevada.

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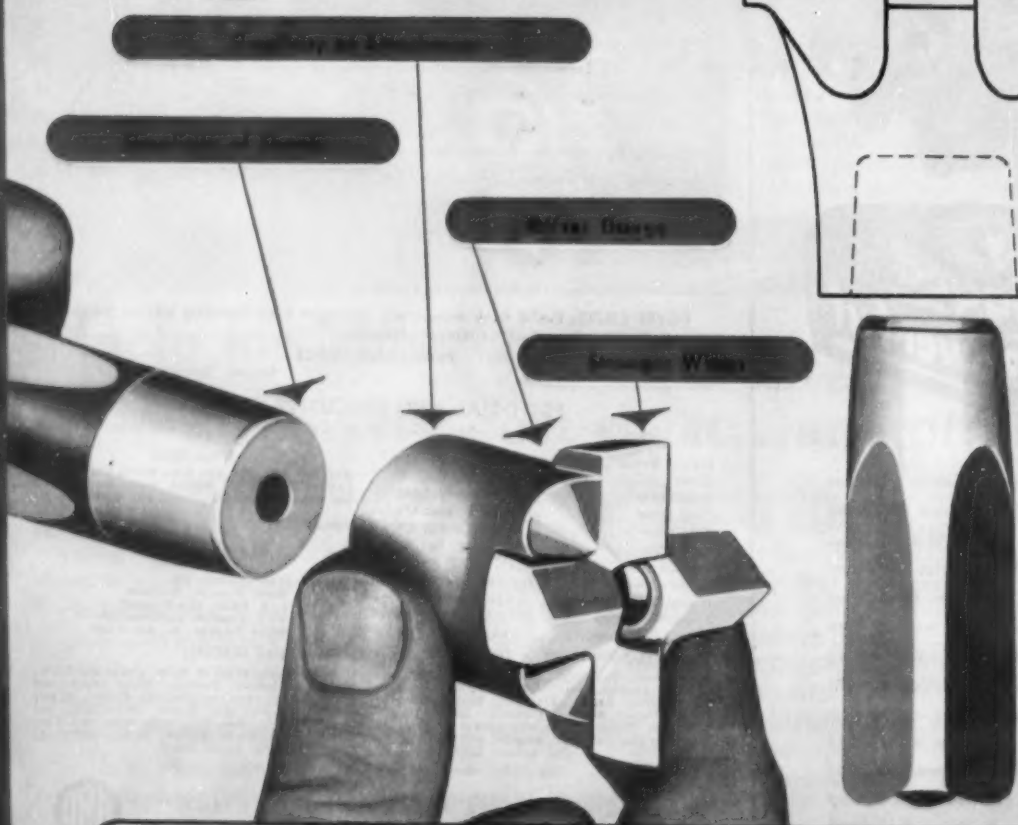
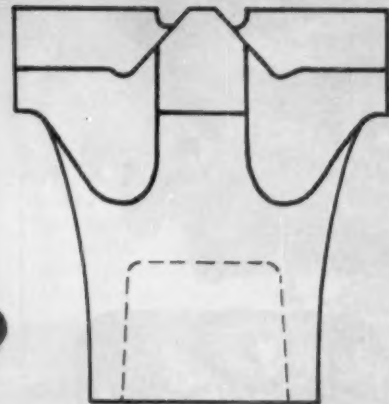
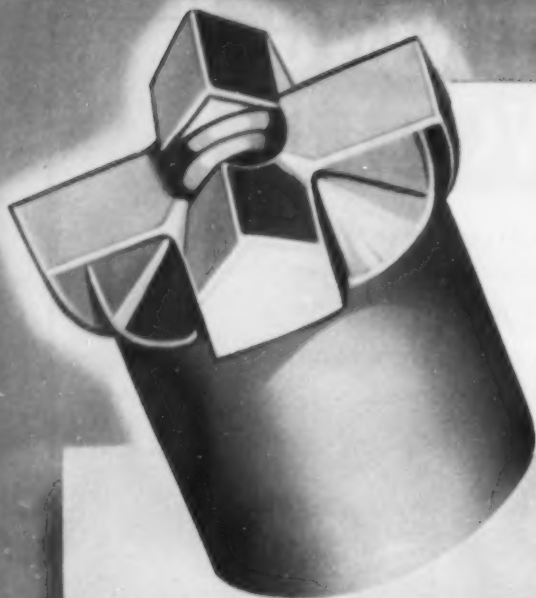
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[World Mining Section—3]

3

Here's another



The union of the bit and the red after drilling has a cohesive strength of several tons . . . A sharp blow of sufficient weight on the end of the bit skirt will serve to detach the bit from the red.

SPECIFICATIONS

Mines everywhere cut drilling costs with CRD DETACHABLE DRILL BITS • 4 - Wing Type - Center Hole - Side Hole

Class "A" Bits	Size	Color	Class "B" Bits	Size	Color
For class "A" drill steel connection on any steel. Best suited to 2/3" steel.	1-1/4	Aluminum	For class "B" drill steel connection on any steel. Best suited to 1", 1 1/8" and 1-1/4" steel.	1-7/16	Orange
	1-5/16	Pink		1-1/2	Green
	1-3/8	Deep Green		1-9/16	Yellow
	1-7/16	Brown		1-5/8	White
	1-1/2	Grey		1-11/16	Black
	1-9/16	Maroon		1-3/4	Red
	1-5/8	Deep Blue		1-13/16	Blue
				1-7/8	Tan
				1-15/16	Plain
				2	Pink
				2-1/8	Maroon
				2-1/4	Aluminum

Cans are labeled showing size of steel socket, gauge of bit, and color.

way to cut drilling costs!

Use Le Roi-CLEVELAND one-use CRD Detachable Bits



Lower cost per foot of hole — that's the goal of everyone who has rock to drill. And that was the goal of Le Roi-CLEVELAND engineers, too. They didn't fool around with the problem either.

Fifty years of experience in designing rock drills was put to work. The result — a one-use detachable bit that can save you money in a wide variety of applications.

This designing job wasn't done overnight. You can't produce the results our engineers were after in such a short time. Instead, these bits were put to work—and, for a number of years they have helped reduce drilling costs materially in mines, in quarries, and on construction jobs.

That's why we offer them to you now — with complete confidence in their ability to help you improve your rock-drilling cost picture.

These Features Mean Lower Drilling Costs for You

Faster Drilling Speed — Special offset gauge feature, which permits the use of thinner wings and a steeper reaming angle, greatly reduces binding and provides ample

clearance for cuttings. Result is a free, fast-cutting chiseling action that gives you greater drilling speed.

Less Drill-Steel Breakage — The method of attachment used with the CRD bit eliminates threads on the drill rod. Since a drill rod is only as strong as the root diameters of its threads, the tapered threadless CRD design provides longer drill-steel life — reduces drill-steel handling and reconditioning costs.

Lower Rock Drill Repair Costs — Because the CRD bit design reduces binding in the hole, there is less strain on the rotation parts of your rock drills. Rifle bars, rifle nuts, and chucks last longer. You get more drilling done at lower cost.

Since no special equipment is needed to thread rods, you owe it to yourself to try a can of CRD bits. They're ideal for roof bolting and for use in your stopes as well as in your headings. A short trial will give you first hand information on the ability of these bits to cut drilling costs in your property as they have in so many others.

Bulletin RD-29 gives detailed information. A copy is yours for the asking — just write for it.

RD-29



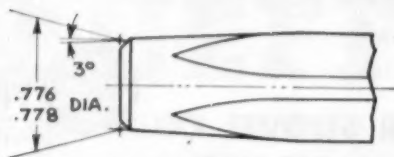
CLEVELAND ROCK DRILL DIVISION

Le Roi Company

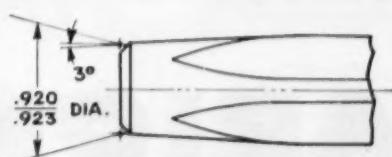
A Subsidiary of Westinghouse Air Brake Co.

12500 BEREA ROAD • CLEVELAND 11, OHIO

Plants: Milwaukee, Wis. • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Mich.



Taper shank dimensions for 7/8" steel.
Class A Bits



Taper shank dimensions for 1" hex,
1" Q.O., 1 1/8" and 1 1/4" rd. steel.
Class B Bits

The taper attachment shank used with the CRD bit is easy to make. You need no dies or other expensive threading equipment. Several simple, low-cost methods can be used for preparation — grinding, forging or machining.

STAMINA IN ACTION!



MARION 4161

"Smooth — fast — lots of life." These are comments of operators on a fleet of seven MARION 4161 shovels in an eastern mine.

They could add "dependable—powerful—and economical" too, for the 4161 is famous for these qualities in the world's hardest digging.

The strength designed and built into the 4161 is matched by its Ward-Leonard Elec-

tric power. With Amplidyne or Rototrol controls, it has small-machine speed with big-machine output. Protection against overload is automatic.

You can pay more, you can pay less, but you can't buy more machine value anywhere if you need production, dependability and low-cost operation in hard digging. Ask for Bulletin 394.

MARION

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from $\frac{3}{4}$ cu. yd.
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assure steady flow



Acme's Jeffrey-Traylor
Vibrating Feeder



Handles 7-ton
Limestone Rocks

Jeffrey No. 5HM4 Vibrating
Units Give Fixed Flow

Jeffrey-Traylor vibrating feeders deliver the load *when* and *where* you want it. Our engineers will gladly show you how.

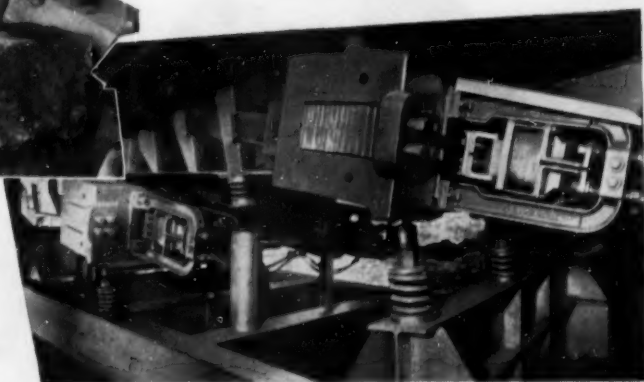
Acme Installation Handles Millions of Tons of Rock With Finger-tip Control

The Jeffrey-Traylor electric vibrating primary feeder shown here keeps even 7-ton blocks of quarry-run rock moving smoothly into the primary jaw crusher at the Acme Limestone Co. plant, Fort Spring, W. Va.

The feeder is 5' wide by 11', 6", powered by four Jeffrey-Traylor electric vibrators, with the operator maintaining precise load control by simply turning a rheostat knob. Rock comes off a single stone deep.

More than a million tons of crushed stone have been handled on one mild steel feeder deck. Acme reports, "This machine was operated throughout last season without any change or one cent of maintenance. It meets every requirement 100 per cent."

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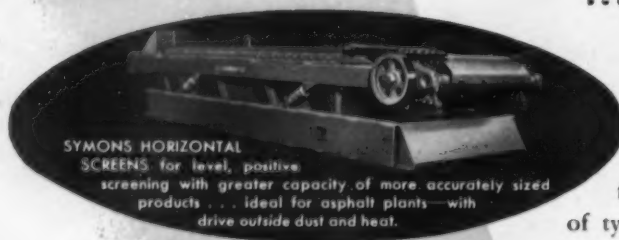
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for heavy duty big capacity,
scalping from 1/2" up to
about 4".



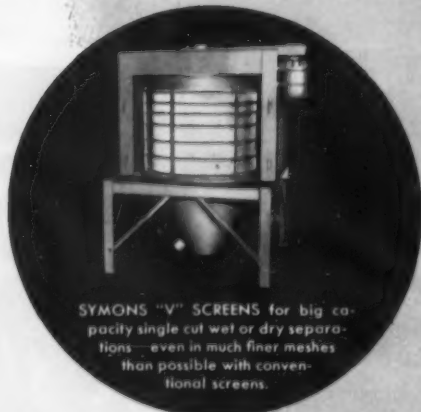
SYMONS VIBRATING BAR GRIZZLIES
for heavy duty large capacity
primary scalping from 1 1/2"
upwards.



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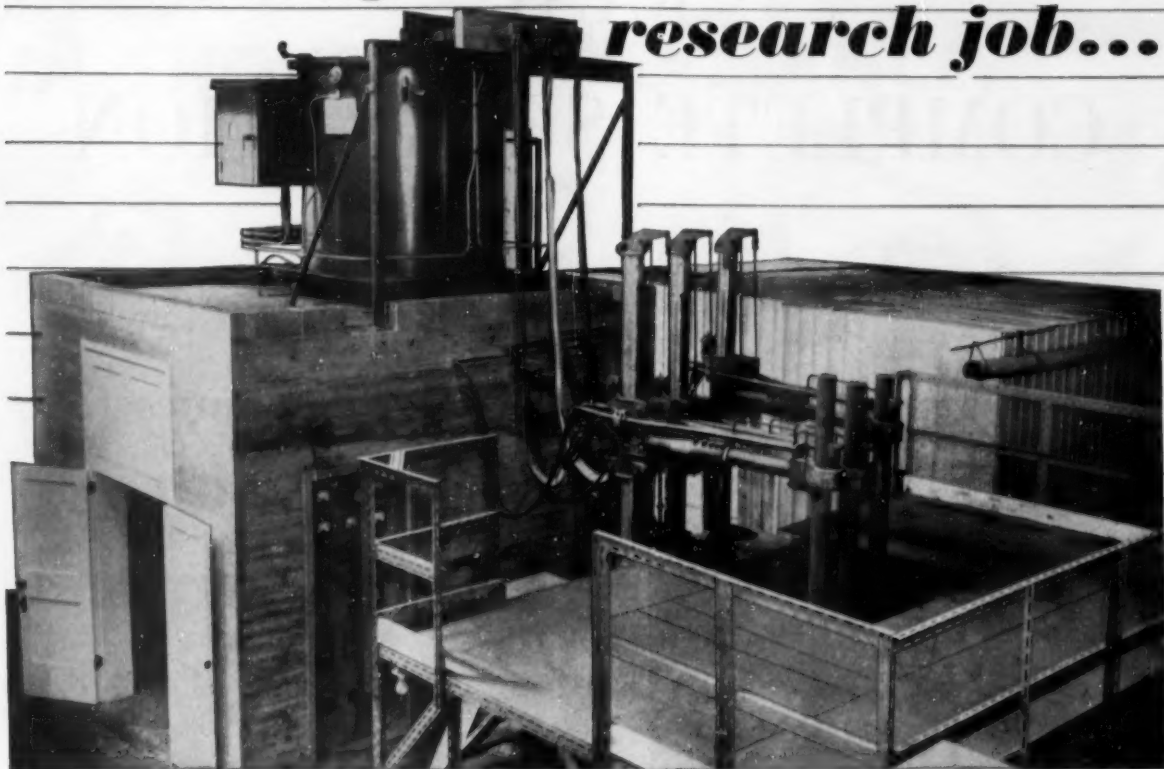
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Address _____

City _____ Zone _____ State _____

5254

Lectromelt goes to Canada on a research job...*



...Department of Mines & Technical Surveys installs 200KVA Lectromelt Furnace for experimentation

Cheap electric power and plentiful mineral resources have led to Canada's exploration of the economies and efficiency of electric smelting. A laboratory has been set up to test high temperature smelting and to determine whether more desirable products can be obtained more practically by using electric furnaces.

Highly satisfactory results already have been obtained in test production of ferroalloy-type material, according to the Division Chief heading the laboratory.

It is anticipated that certain ores will be smelted experimentally to obtain informative data on costs and chemical reactions encountered.

Also, the smelting problems of various refractory materials will be investigated.

Expectations are that the cost of the pilot laboratory will be insignificant compared with the economies and material improvements that will result from this Canadian research. Perhaps you could benefit similarly by installing comparable research facilities.

Lectromelt Furnace engineering assistance is always available to you. Write on any problem. Also write for Catalog No. 105 which describes many types of Lectromelt Smelting and Refining Furnaces, and their versatility. Pittsburgh Lectromelt Furnace Corporation, 324 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liège . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genova. JAPAN: Daido Steel Co., Ltd., Nagoya

MOORE RAPID

WHEN YOU MELT...

Lectromelt

*REG. T. M. U. S. PAT. OFF.

JUNE, 1954

[World Mining Section—9]





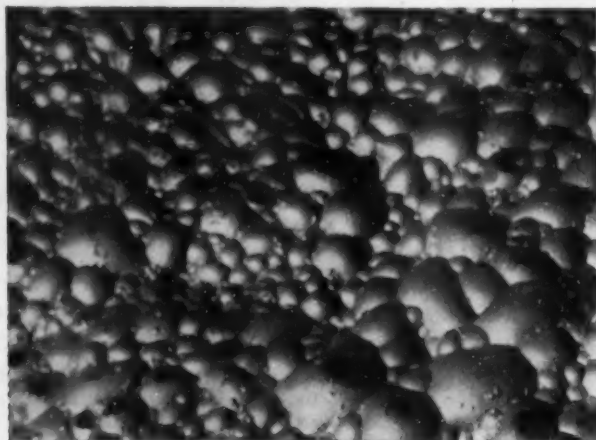
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Assure maximum recovery, and minimum cost
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Increased recovery and improved concentrate grade show up immediately when Dow Xanthates go to work in your mill. This has been proved in mills all over the world where these superior Dow collectors are improving metallurgy and saving dollars.



These Xanthates permit greater freedom in regulating frother and collector independently because they are reliable collectors but substantially nonfrothing.

For a quality frother, however, give Dowfroth® 250 a trial. It builds hard-working froth with reduced consumption.

To learn more about the quality flotation agents, Dow Xanthates and Dowfroth 250, write us for information and test samples. THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. OC 835J.

you can depend on DOW CHEMICALS



MINING WORLD

FOR THAT **EXTRA MARGIN** IN SHOVEL PERFORMANCE...



MORE OUTPUT even under the toughest conditions . . . more loads per shift in any quarry or mine . . . extra loads for that **EXTRA MARGIN** in performance . . . that's what you get from this exclusive combination of shovel front-end features:

1. **TWO-SECTION BOOM** provides maximum strength with minimum weight. The lower section is rigidly connected to the A-frame . . . takes the heavy stresses of the digging cycle in stride because it is part of the main machine.
2. **TUBULAR DIPPER HANDLE** is much lighter than equivalent two-member handle, yet equally strong. Its ability to rotate in the rubber-cushioned saddle block eliminates torsion during the digging stroke, minimizes shock loads.
3. **TWIN DUAL HOIST ROPES** assure a steady, positive digging action with automatic shift of hoist power to that part of the dipper lip where it is needed.
4. **INDEPENDENT ROPE CROWD** is simple, positive and quiet. Shipper shaft pinions and handle racking are eliminated. Crowd machinery is located on main deck rather than on boom—swing inertia is reduced, the operating cycle speeded up.
5. **QUICK CONVERTIBILITY** to dragline of the independent motor type. Hoist and drag functions are powered by separate motors, eliminating operating clutches and brakes.

These features—plus many more—make Bucyrus-Eries the finest heavy-duty excavators ever built; yard for yard, dollar for dollar, pound for pound. Write today for complete information on the 4½-yd. 110-B, the 6-yd. 150-B, or the 8-yd. 190-B.

**Bucyrus-Erie
Company**

**SOUTH MILWAUKEE
WISCONSIN**

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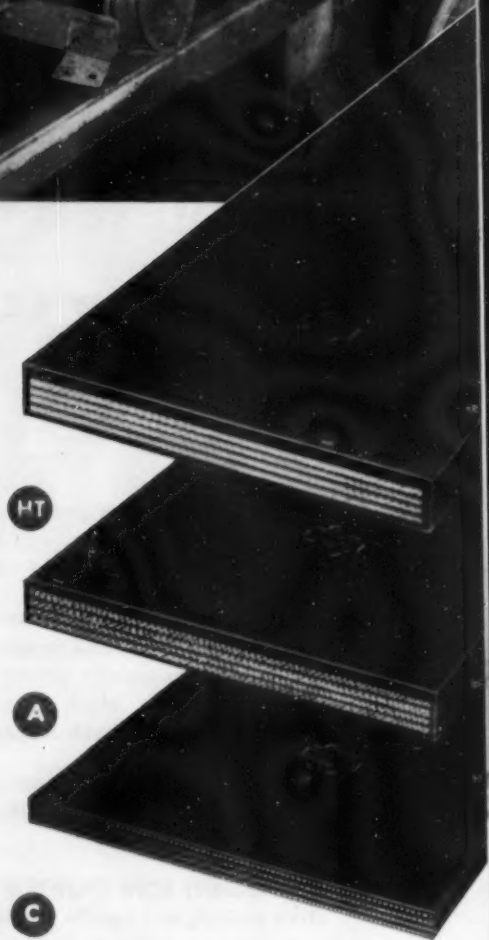
Thermoid
Conveyor Belting
cuts handling costs
on rugged mining jobs



There's a Thermoid Conveyor Belt designed to lower your handling costs on every mining job. Here are three examples:

HT —For extremely abrasive materials such as coal, granite, trap rock, flint rock, quartz ore; **A** —For slag, lime rock, crushed stone and other highly abrasive materials; **C** —For moderate abrasives such as sand, loam, soda, gravel.

Thermoid's exclusive impregnation process welds carcass and cover into an exceptionally strong, durable belt. Finest quality reinforcement and specially compounded rubber stocks assure long life . . . lower your handling costs per ton. Your Thermoid Distributor can help you select the Conveyor Belt best suited to your requirements. Or if you prefer, write direct for Catalog #3679.



Thermoid

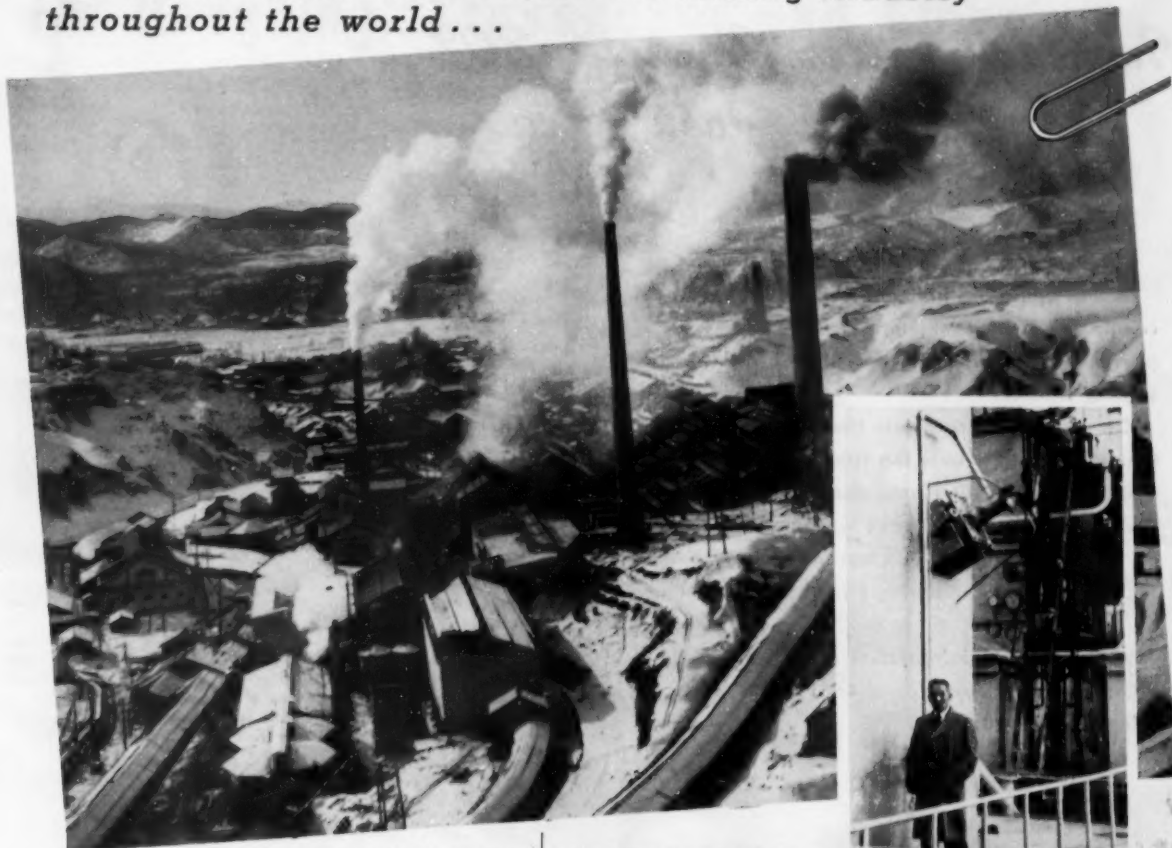
Western Co.



Conveyor & Elevator Belting • Transmission Belting • F.H.P. & Multiple V-Belts
 Wrapped & Molded Hoses • Rubber Sheet Packings • Molded Products
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How Dorrco Worldwide serves the mining industry throughout the world...



Dowa Mining's Kosaka hydro-metallurgical plant where FluoSolids roasts 83 metric tons of complex copper-zinc concentrates per day.

Hidesaburo Kurushima, President of Dowa Mining Co., beside the Reactor in the FluoSolids section of the plant.



FluoSolids — key to copper-zinc extraction from a single electrolyte in Japan...

Dowa Mining Company's Kosaka, Japan, hydro-metallurgical plant represents the world's first successful roasting of copper and zinc with electro-winning of both metals. The Dorrco FluoSolids System — coupled with a war-born electrolyte recovery process — made this economically sound innovation possible.

Collaborating on the project with Dowa engineers were our research, design and engineering staffs in the United States and our Associates in Japan, Sanki

Engineering Co. Ltd. of Tokyo. Manufacture of the FS Reactor and a number of components in Japan, with the auxiliary equipment furnished from the U. S., proved to be most advantageous to Dowa.

This is but one example of how the flexibility of the Dorrco Worldwide engineering organization has worked to the advantage of a client. It can work for you too, through any of the following Associated Companies and Representatives, all with facilities for local manufacture.

FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

In Europe: Dorr-Oliver Companies in England, Belgium, The Netherlands, France, Germany and Italy.

In South Africa: E. L. Bateman Limited, Johannesburg.

In India: Dorr-Oliver (India) Limited, Bombay.

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In South America: Fiore Company in Buenos Aires; Serva Ribeiro in Rio de Janeiro and Sao Paulo; John Lindsay in Caracas; and conveniently located Dorr Resident Engineers.



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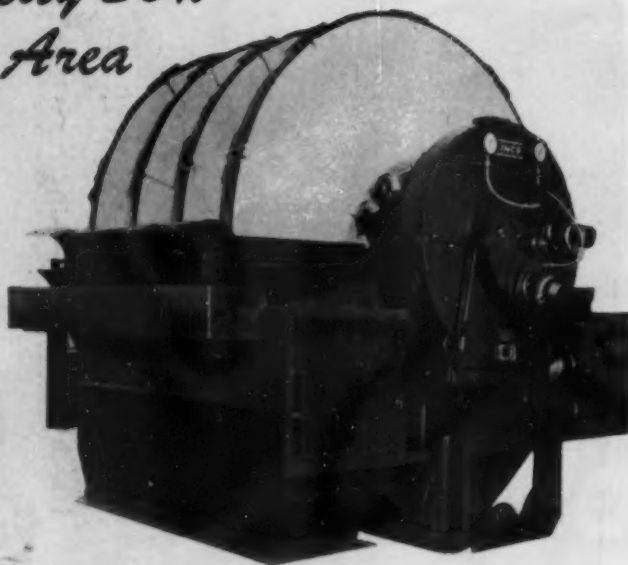


Increase Filter Capacity 20% Per Square Foot Area

Actual operating data from important mining companies show that Eimco Agidisc filters improve the recovery of concentrates from fast settling slurries.

On a copper concentrate the improvement in tonnage was 20% over the conventional disc on a square foot of filter area per hour basis. The moisture content of the cake was $1\frac{1}{2}$ to 2% less on the Eimco Agidisc and approximately $\frac{1}{2}$ of 1% less than on a drum type filter operating on the same feed.

Write for more information on Eimco Agidisc filters to the Eimco Corporation, P. O. Box 300, Salt Lake City 10, Utah.



Above: An Eimco Agidisc — 8' diam. x 4 disc. Below: An Eimco 8' diam. x 10' Agidisc dewatering a fast settling slurry. Note the smooth, evenly distributed cake.



THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

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You Can't Beat An Eimco

Use Denver "Sub-A" Flotation Machines for Roughing, Scavenging and Cleaning



DENVER "SUB-A'S" RECOVERING NICKEL: In Canada, Denver "Sub-A's" play an important part in processing 40,000 tons a day of nickel-copper ore. Here are several of the 552 No. 30 (56x56) Denver "Sub-A" Flotation Cells operated by this company. Denver "Sub-A" Flotation was selected after extensive tests. Denver "Sub-A" Flotation is standard in practically all copper-nickel mills.

High Grade Concentrate

Denver "Sub-A's" are recognized the world over for their ability to produce high grade selective concentrates.

DENVER "SUB-A'S" RECOVERING LEAD AND ZINC: Denver "Sub-A" Flotation Cells in large Australian lead-zinc mill. Lead rougher flotation is accomplished in a 12-cell No. 30 (56x56) Denver "Sub-A" and cleaning is done in a 10-cell No. 24 (43x43) Denver "Sub-A." Zinc flotation is performed with identical units.



High Economic Recovery

More large plants are recognizing the importance of installing Denver "Sub-A's" for their entire flotation job—roughing, scavenging, cleaning and re-cleaning. This practice results in maximum recovery and lowest cost per ton of ore treated.

DENVER "SUB-A'S" RECOVERING COPPER: Here 3000 tons of copper ore per day are processed in 120 No. 30 (56x56) and 32 No. 24 (43x43) Denver "Sub-A" Flotation Cells. These cells were installed for both roughing and cleaning after a series of competitive tests with other flotation machines.



Low Maintenance and Power Cost

The Denver "Sub-A" is easy to maintain. Many operators report wearing life of parts of 2 to 15 years. Power is low and used efficiently. No pumps are required to recirculate froth and middlings in the cleaning circuits.

For further details on improving your flotation circuit, please write to DENVER EQUIPMENT COMPANY, 1400 17th St., Denver 17, Colorado, phone CHerry 4-4466.



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POWER SWING JUMBOS

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REMOTE CONTROLLED DRILLS

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All positioning and drilling operations hydraulically operated and remotely controlled from driller's station. All positioning hydraulically locked. Write for information.



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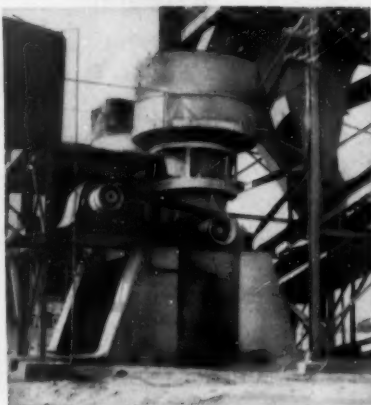
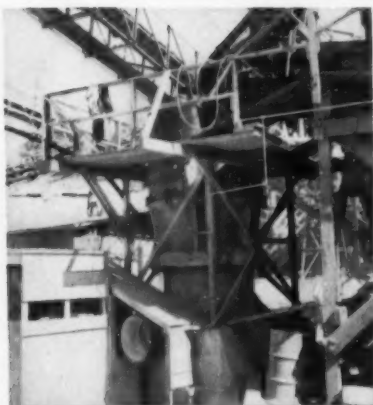
THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

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806 OWNERS OF TRAYLOR TY REDUCTION CRUSHERS SAY

Production is the Payoff...

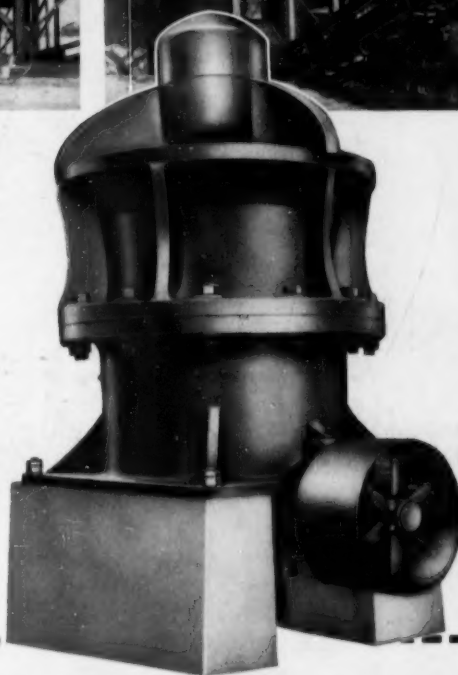


Greater Tonnage...Greater Profits

THE EXCLUSIVE Traylor design features and extra-heavy construction of a TY Reduction Crusher increase your production tonnage by reducing maintenance down-time and boosting hourly out-put with fewer waste fines.

Traylor TY's original, self-tightening bell head and curved concaves apply crushing power with greater efficiency. Increased capacity of each succeeding zone in the crushing chamber permits fine settings to produce greater tonnages with reduced power requirements.

Type TY Traylor Reduction Crushers are of compact design . . . incorporating maximum strength with simplified operation. Six sizes with feed openings from 3" to 22". Send for free bulletin 7112.



Traylor

TY REDUCTION CRUSHERS

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Send me Bulletin 7112 with complete description, illustrations and specifications on Traylor TY Reduction Crushers.

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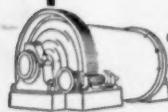
Primary Gyratory Crushers



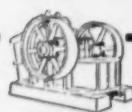
Rotary Kilns



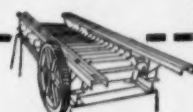
Secondary Gyratory Crushers



Ball Mills



Jaw Crushers



Apron Feeders



"They Slept on the Problem"

and learned how to produce
low-iron glass sand with
Cyanamid 800 Series Promoters

Hours of testing had come to naught. Flotation with 800 Series Cyanamid Promoters would produce low-iron glass sand at Del Monte Properties but 65% recovery was far too low. Puzzled and tired, the Pilot Plant Superintendent and the Cyanamid Field Engineer decided "to sleep on the problem". But, on a hunch, they left a batch of sand to scrub at 50% solids in a lab flotation machine.

Next day, instead of white sand, they found a black pulp . . . and the key to a workable process. Prolonged attrition had removed an iron-bearing clay. Flotation of the scrubbed sand now yielded 95% recovery of an 0.055% Fe_2O_3 glass sand!

Del Monte Properties at Pebble Beach, California is an excellent example of the use of chemical flotation to convert beach and dune sand into four valuable, custom-built products.

Raw sands, comprising equal parts of quartz and high-alumina minerals, average 0.12 to 0.15% Fe_2O_3 and 11.5% Al_2O_3 . Scrubbed in specially designed attrition machines, these sands are then de-slimed, conditioned and the iron-bearing minerals floated, leaving behind 95% of the feed in a finished product that assays 0.06% Fe_2O_3 and 10.76% Al_2O_3 .

Flotation reagents per ton include: 0.45 lb. sulfuric acid, 0.40 lb. fuel oil, 0.01 lb. pine oil, 0.55 lb. AERO* Promoter 801 and 0.45 lb. AERO Promoter 825.

Subsequent flotation in another section produces a high-grade feldspar concentrate and a practically-pure (99.07% SiO_2) quartz tail-

*Trade-Mark

ing. Feed to this section can be split to control the quantity of iron tailings floated, thereby controlling alumina in the end product. Del Monte Special "77" Sand, for instance, containing only 6.50% Al_2O_3 and 0.051% Fe_2O_3 commands an active, premium market.

Cyanamid 800 Series Promoters are now being used to beneficiate glass sands, feldspar, garnet, barite, kyanite, rhodochrosite and similar non-metallic minerals. Cyanamid also offers Heavy-Media Separation and Dutch State Mines Cyclone Separator Processes, both of which merit investigation for non-metallic mineral concentration by gravity difference.

With the practical help of a Cyanamid Field Engineer experienced in up-grading low value non-metallics, you may be able to cut costs by less-selective mining, work currently sub-marginal deposits or ship higher-grade end products. Preliminary discussion entails no cost or obligation. Why not write, outlining your problem?

It will pay you to talk with a Cyanamid Field Engineer if you mine or contemplate mining:

Andalusite • Barite • Bauxite • Cement Rock • Coal • Chromite
Diamondiferous Ground • Dolomite • Feldspar • Fluorspar
Garnet • Glass Sands • Graphite • Gravel • Gypsum • Ilmenite • Iron
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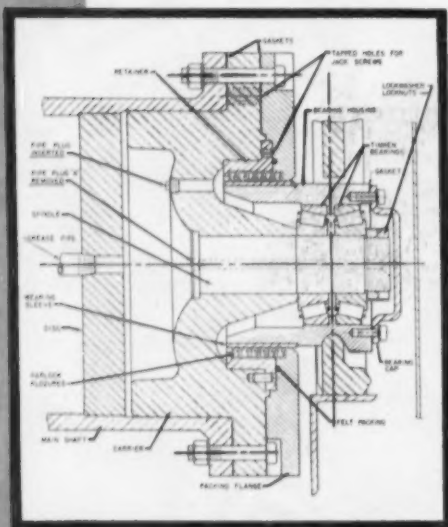
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how

AKINS

leadership in mechanical performance can help you cut costs

Classifiers and heavy media separators are selected on the basis of low-cost-per-ton output resulting from efficient, dependable mechanical and metallurgical performance. That's why so many successful mining companies throughout the world continue to order *and reorder* Akins.



for example...

the patented submerged bearing

- the Akins submerged stub-spindle bearing assembly is designed for equal distribution of radial and thrust loads between two tapered roller bearings. This design provides a sturdy bearing with less wear, lower initial and maintenance costs and dependable, continuous operation... one of the many Akins features which result in lower-cost-per-ton production.
- patented Akins method of lubrication through center of mainshaft eliminates grease pipes in pool and provides convenient, centralized lubrication of all grease fittings on main drive.

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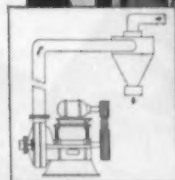
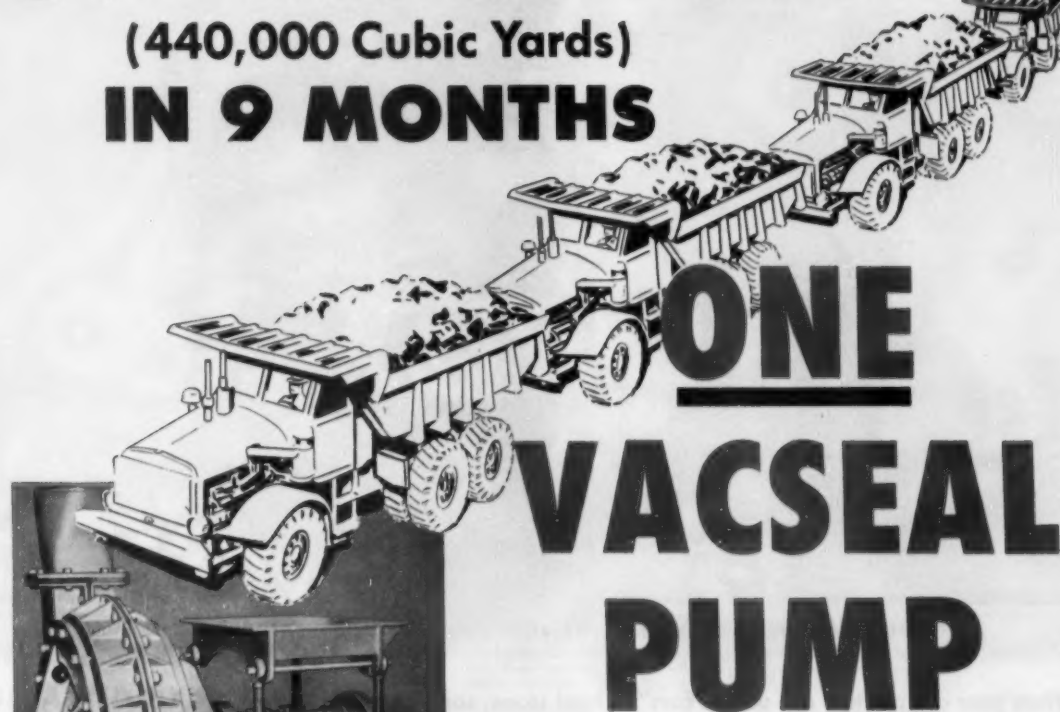
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157 miles OF SOLIDS
(440,000 Cubic Yards)
IN 9 MONTHS



Drawing illustrates this Vacseal application — pumping flotation tailings to a 24" Cyclone.

OTHER GALIGHER PRODUCTS

Agitair Flotation Machines . . Commercial and Laboratory Agitair . . Laboratory Ball Mills . . Geary-Jennings Samplers . . Geary Reagent Feeder . . Laboratory Pressure Filters . . Acid-Proof Sump Pumps.

Traveling bumper-to-bumper, 157 miles of trucks — each carrying 14.8 cubic yards — would be required to convey the 440,000 cubic yards of solids delivered by one 8" Vacseal Pump in nine months of continuous (24 hour day-7 day week) operation. Actually, this mountain of material — mill tailings at 15% solids — was pumped at one of the world's largest metal mines. When finally shut down for repairs, the Pump was overhauled in a few hours time at a parts cost of less than .3 of 1c per ton of solids pumped. Now it is back on the job, performing like new! This authenticated Vacseal record from a world-famous mine is in our files. We invite correspondence and suggest that you write today for literature that gives the reasons why Vacseal standard and vertical pumps can deliver such amazing volume at so low a cost.

(Full details on request)

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CONSULTATION • ORE TESTING
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JUNE, 1954

[World Mining Section—21]

21

SMALL QUARRIES AND MINES IMPROVE THEIR PROFIT PICTURE WITH "EUCS"



fewer drivers . . . lower fuel cost . . . reduced maintenance

When your competitors are using "Eucs" to haul stone, sand or gravel, you've really got a problem on your hands! You just can't afford to pass up the cost cutting advantages . . . the high production and low maintenance cost . . . that you get with "Eucs".

And your operation doesn't have to be a big tonnage producer for "Eucs" to pay off. For example, H & R Stone Co. of Indiana is just one of many small quarries, sand and gravel producers, and open pit mines that have cut their hauling costs with Model UD 10-ton Rear Dumps. This quarry replaced four conventional highway trucks with a single 10-ton "Euc" and reports savings of \$6000 per year in maintenance cost alone. Because the "Euc" stays on the job with none of the lost time that was a costly headache previously, there have been important savings in labor cost, too.

Have your nearby Euclid Distributor provide a production and cost estimate for your operation . . . there's no obligation and the chances are mighty good that he can show the way to better profits through lower hauling costs.



10-ton
off-highway
"Euc"

Cable Yuklid - Code Bentley

EUCLID DIVISION
GENERAL MOTORS CORPORATION
Cleveland 17, Ohio

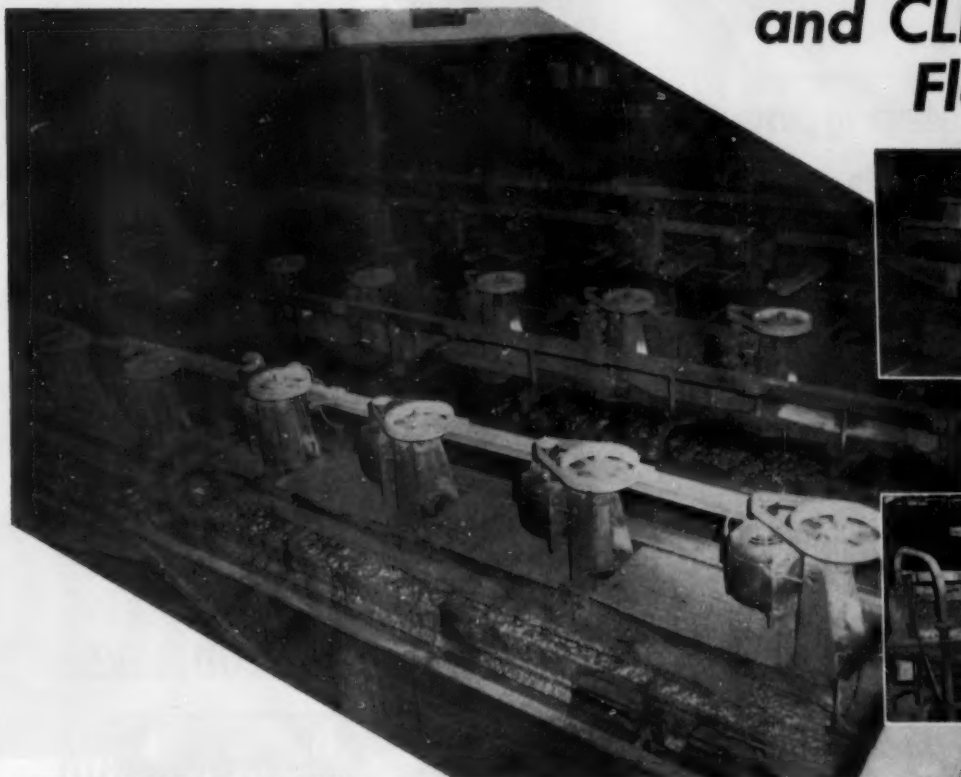


Euclid Equipment

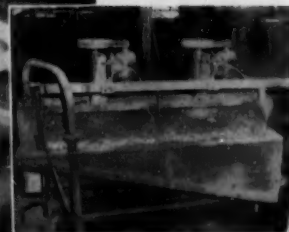
FOR MOVING EARTH, ROCK, COAL AND ORE



FAGERGRENS pay off in both ROUGHER and CLEANER Flotation



Fagergren cells in lead cleaner flotation circuit.



Fagergren cells in zinc cleaner flotation circuit.

HERE ARE THE RESULTS OBTAINED BY A MAJOR LEAD-ZINC PRODUCER

Fagergrens used for rougher flotation by Pend Oreille Mines & Metals Co., Metalfine Falls, Wash. Zinc circuit in foreground, lead circuit in center; duplicate circuits being installed in background.

48 Fagergren Flotation Machines are used by Pend Oreille Mines & Metals Co. in flotation circuits having a capacity of 1600 tons per day. The ore is hard and abrasive with lead (as galena) occurring in coarse crystals and zinc (as sphalerite) finely disseminated in the gangue. Specific gravity of ore is 2.7 to 2.8.

Fagergren's highly efficient performance in this application produces superior metallurgical results, as follows:

1. Lead concentrate grade averaging well over 70% lead.
2. Zinc concentrate grade running close to 60% zinc.
3. Recoveries of approximately 95% lead and zinc in respective concentrates.
4. Exceptionally low lead and zinc tailing assays.

High Metallurgical Efficiency, as demonstrated above, is not unusual with Fagergrens. It is based on the faster rate of flotation and greater flotation recovery made possible by Fagergren's exclusive Rotor-Stator design. This superior agitating mechanism is unmatched for effective pulp circulation and aeration with resulting greater capacity per cubic foot of cell volume and higher mineral recovery.

Specify Fagergrens for your next installation or as replacements for older, less efficient machines. Send today for free copy of Fagergren descriptive bulletin and for recommendations concerning your flotation problem.

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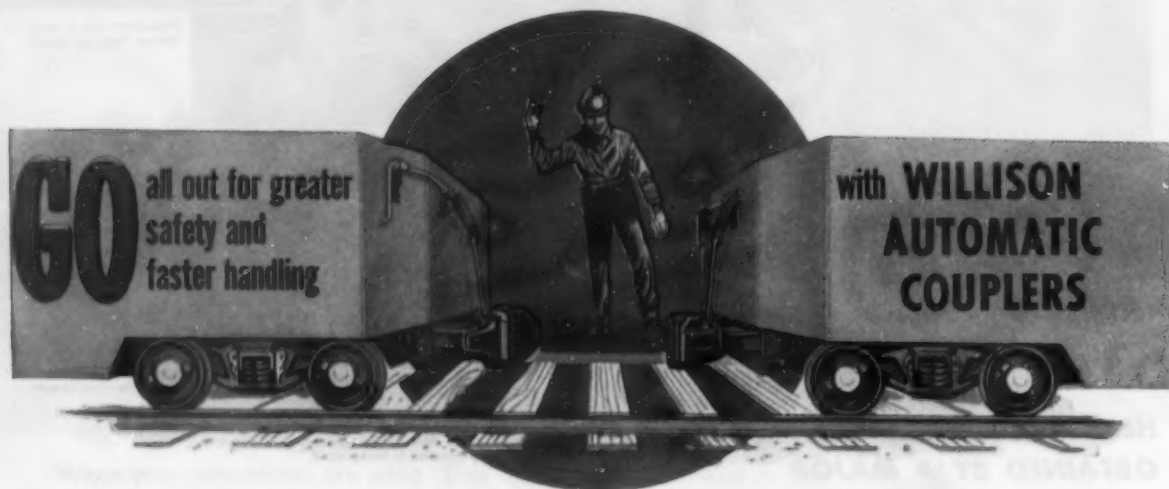
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With Willison Automatic Couplers there's no need for personnel to go between cars to couple or uncouple. That means safety—and faster handling because Willisons uncouple from either side. All Willisons couple with each other automatically—there's no matching of coupler heads.

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MAXIMUM DELAY INTERVAL FLEXIBILITY WITH DU PONT MS CONNECTORS simplifies blasting in open-pit operations

For good fragmentation in hard-shooting Taconite . . . for reduced vibration and backbreak . . . for better control of the amount and direction of throw . . . all with maximum safety . . . use Du Pont MS (millisecond) Connectors.

Du Pont MS Connectors are available in two delay periods, MS-9 and MS-17. These can be used singly or in combination to provide the most effective interval for your job.

With Du Pont MS Connectors you can obtain any desired arrangement of delay firing between holes and rows—the hookup can be completed quickly and with minimum hazard.

Investigate the advantages offered by Du Pont MS Connectors. They're an important member of the Du Pont ore-blasting "team." For more

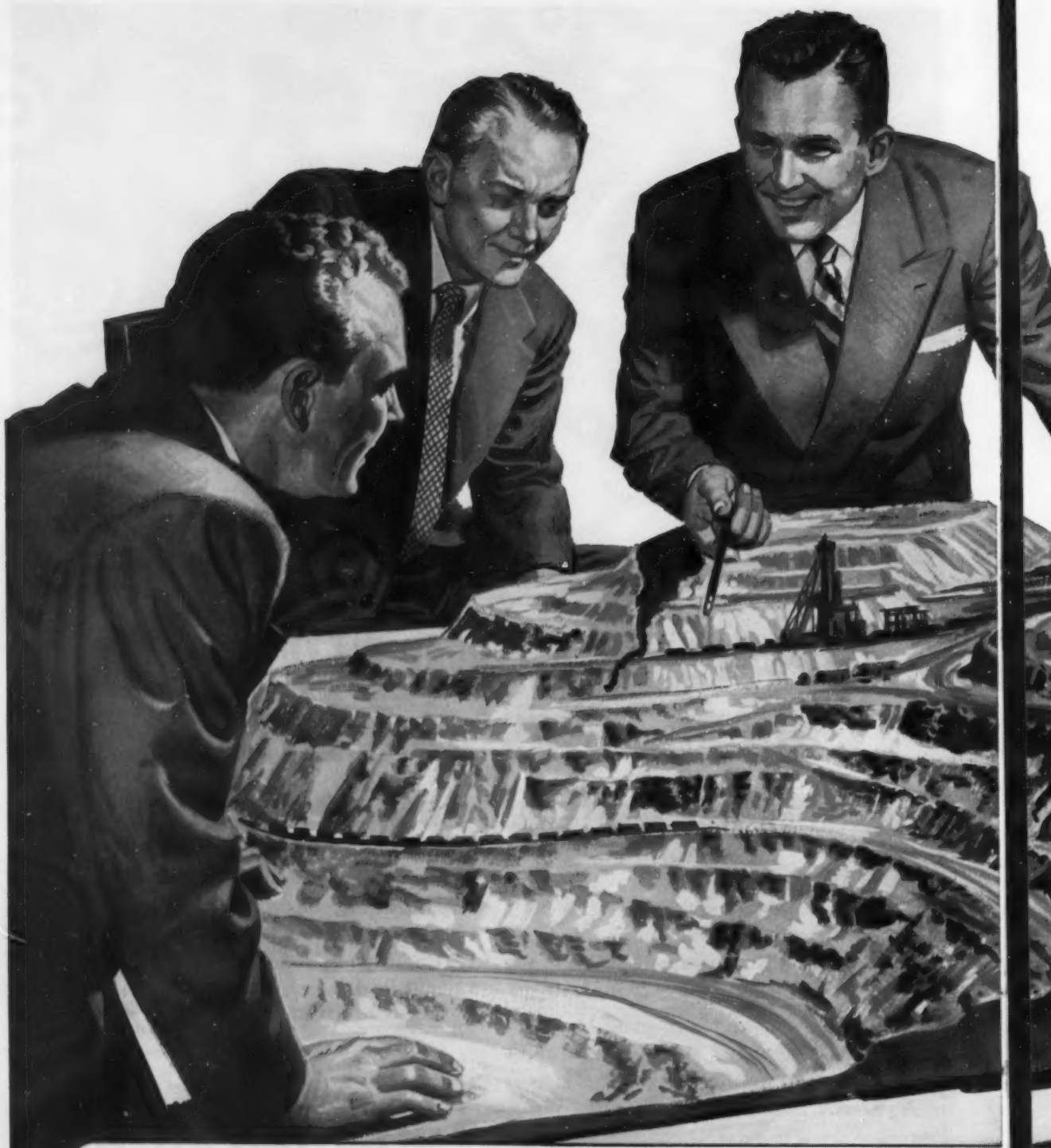
complete information ask the Du Pont representative in your own district. You'll find him glad to be of service. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

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if you want lower V-Belt costs —



When a V-Belt bends,
you can feel its sides
change shape.

*just make
this simple test*



Take *any* V-belt that has *straight* sides (Fig. 1). Bend that V-belt while you grip its sides with your fingers. You will *feel* the sides *bulge out* (Fig. 1-A). Clearly, that out-bulge forces the belt to press *unevenly* against the V-pulley—and this *concentrates* wear at the points shown by arrows (Fig. 1-A).

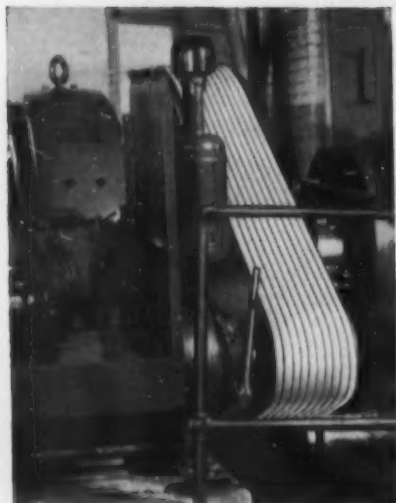
Now bend a Gates Vulco Rope with **CONCAVE SIDES** (Fig. 2)

(U.S. PAT. NO. 1813698)



Instead of *bulging*, the precisely engineered **CONCAVE SIDES** merely *fill out* and become perfectly straight. This belt, when bent, *precisely fits* its sheave groove (Fig. 2-A). The sides of the Gates Vulco Rope press *evenly* against the V-pulley. Therefore, wear is distributed *uniformly* across the *full face* of this belt—resulting in *longer* belt life and *lower* belt costs for you!

When you buy V-belts, be sure to get the V-belt with the Concave Sides—the Gates Vulco Rope!



Typical Gates Vulco Rope Drive
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to insure longer belt wear.



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DENVER, U.S.A.

CS-543

MINING WORLD

Standard Engineer's Report

CASE HISTORY

PRODUCT *Calol Vistac Oil*
FIRM *Victorville Lime Rock Co., Victorville, Calif.*

One grade of oil ends desert heat-range problems!



CALOL VISTAC OIL 14X is the only lubricant tried that stays on pistons and other air-tool parts in spite of extreme temperature changes at the Victorville Lime Rock Co.'s quarry at Victorville, Calif. Temperatures range from 0°F. to 120°F. in this desert area, often change as much as 75° from early morning to afternoon. Oils previously used failed to stay in place except in a narrow range of temperature. Calol Vistac Oil 14X prevents excessive wear, sticks on bearing surfaces and helps keep them clean although tools constantly work in heavy abrasive dust around drills above.

REMARKS: Quarry is in natural deposit of exceptionally pure calcitic limestone. Rock is ground to fine calcium carbonate, used for paint fillers and extenders, and for many other applications.

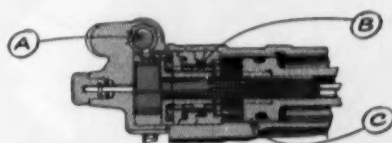
FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush Street, San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.



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How CALOL Vistac Oil cuts cost in air-tool equipment



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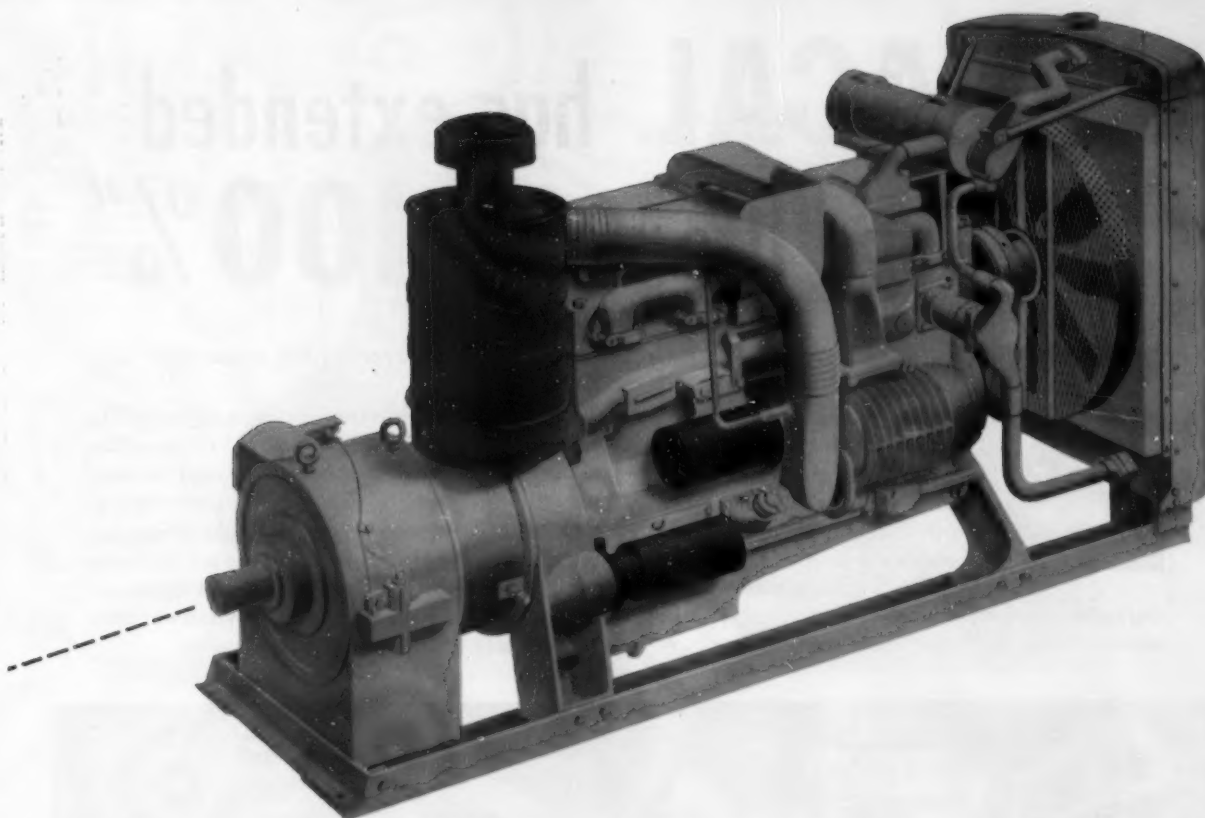
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Gives full utilization of horsepower, minimizes shock





loads, adds to life of shovels, cranes, and draglines

Cummins Torque Converter Packages give smooth steady power over the entire digging or working cycle. Even where digging is the toughest and power requirements fluctuate widely, the Cummins Torque Converter maintains power without lugging, stalling or overspeeding. Crane work, too, can be speeded because loads can be handled more smoothly and accurately.

The output of the Cummins Torque Converter Package is measured by an output shaft governor

which determines the exact amount of power required each instant and automatically matches engine speed to load requirements. This increases work capacity, adds to equipment life, saves fuel and engine wear.

Cummins Diesels, ranging from 60 to 600 h.p., equipped with one of many types of torque converters, can match any job you have. Available as replacement units or in many makes of new equipment.



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Rugged diesel power (60-600 h.p.)

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(4-B-54)

"UNACAL has extended our rope life nearly 100%"



Stanley McDougall,
mine superintendent,
Sullivan Mining Co.,
Kellogg, Idaho.

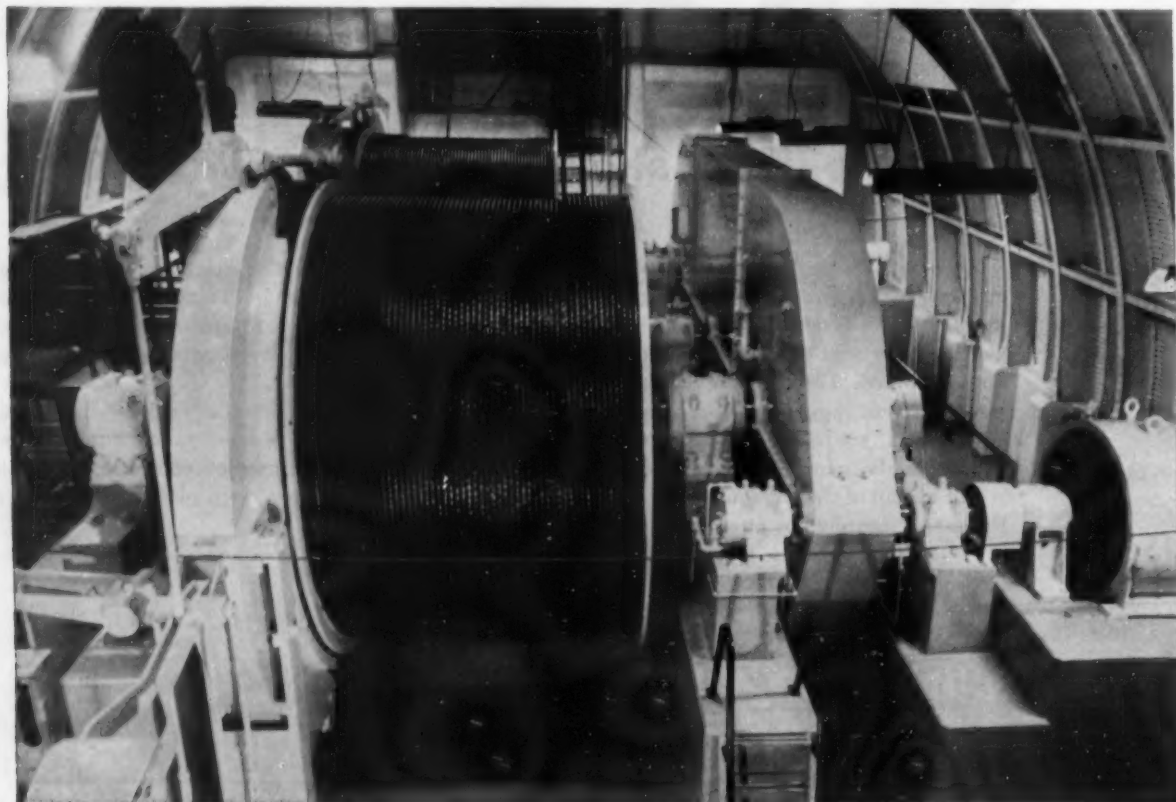
"During the 10 years we've used Unacal Cable Lubricant, Union Oil Company's lubrication engineers and research experts have worked hand in hand with us.

Our combined efforts have solved many of the problems encountered in wire rope lubrication, and we have

extended our rope life nearly 100%, at a saving of many thousands of dollars.

"Our hoist ropes work in temperatures as high as 90° F., are constantly wet with acidic water and subject to the abrasive action of dirt and rock dust. They need the tough protective film which Unacal Cable Lubricant supplies."

Whether your problem is a special one or whether you're looking for dependable, day-in, day-out lubricants, you'll find it pays to consult your Union Oil representative. He knows the petroleum products which can serve you best and save you money. Call him and see.



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"Say, what's wrong with my mine cable?"

"Lots of times we find cable sections like this—necked-down. And that's only one of our troubles. Our cables short out too often. Sometimes jackets creep back from splices. Other times we find broken ground wires. What in thunder are we doing wrong?"

"Well, here's a big part of your trouble:"

"Hourglass sections are a sure sign of too much tension on the cable. So are the other troubles you mention. To end tension . . . keep spring-type shocks at the power source. Keep the reel pulling evenly. Adjust it so there's no back-spooling. Watch out for kinks. And be sure you use a cable that can take it when the going gets tough. Then you'll put an end to your trouble and keep your cables on the job far longer. And remember, one break costs more than the difference in price between a cheap cable and a quality one!"



Be sure with Anaconda's new shuttle car cable

Are cables all alike? No! Quality cables — like ANACONDA's Securityflex* — have proved themselves over the years. Here's why ANACONDA Cables last longer and are safer. The ground wire can stretch more. It will *not* break before the power conductors. *That's a real safety feature.* Jacket is made of a new Neoprene formula. It is stronger. Insulation is long-life, tough cold rubber. It all adds up to real economy *in use.* Get the full facts from your Anaconda Representative. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trade Mark

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the right cable for the job

ANACONDA®

WIRE AND CABLE

new!



ATLAS Shotmaster BLASTING MACHINE

The first condenser discharge type blasting machine utilizing a high voltage DC generator directly connected to charge the condensers.

Dependable blasting starts with a dependable blasting machine. And this new Atlas blasting machine is designed to give you every advantage in dependability and safety.

Hand actuated generator operation does away with battery replacements and gives consistent voltage in both hot and cold weather.

Built-in Volt Meter shows actual voltage while the condensers are being charged.

Adequate voltage assured. The condensers cannot discharge into the firing circuit below a predetermined voltage.

No danger of a residual charge in the condensers. With the condensers connected directly to the generator, any residual charge is dissipated quickly.

For complete information on this new blasting machine, get in touch with your Atlas representative. He will be glad to give you full details and arrange a demonstration if you wish.

Simplified operation. The generator is hand operated. The firing trigger may be closed or open during the voltage build-up. Only when the voltmeter needle indicates optimum power can the firing circuit be activated.

Waterproof. The entire unit is sealed and the switch is waterproof. The new Atlas blasting machine is always ready to go . . . under all conditions.

Sturdy, welded steel case is compact and easy to handle. The whole machine weighs only 30 lbs.

Insulated-type terminals. Binding post screws are made of a non-conducting material. Terminals are well separated for maximum safety.



ATLAS EXPLOSIVES

"Everything for Blasting"

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WILMINGTON 99, DELAWARE

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See that pattern? It's a development of over forty years of selecting, grading and setting diamonds for the drilling industry. The patented matrix is renowned for its holding qualities and resistance to abrasion. Each diamond is precisely placed to give the fastest cutting, best removal of cuttings and clean, accurate cores.

The pattern is one of our "standards." We've many more that were developed for special formations and drilling needs. "Joy-Truco" and "Truco" diamond coring bits, plug bits,

casing bits and reamer shells are available in all standard sizes. There's sure to be one that will solve your particular drilling problem.

Don't forget, wherever you are there's a Joy Engineer close by—as near as your telephone, in fact. He's ready to furnish you with just the right bit for your formation. • More information? Write **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: **Joy Manufacturing Company (Canada) Limited, Galt, Ontario.**

Consult a Joy Engineer

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**"DO'S and DON'T'S" for
DIAMOND DRILLING**

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**WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING EQUIPMENT**



Change bit types without changing drill steels—in one minute flat!



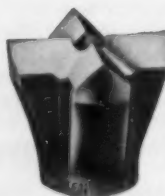
Dozens of different TIMKEN® multi-use and carbide insert bits fit the same drill steel!

WITH Timken® interchangeable rock bits, you can change quickly to the right bit for the job. It takes only a minute to unscrew one type of Timken bit and screw another type on the same drill steel—right on the job! Dozens of different Timken multi-use and carbide insert bits fit the same drill steel. No time wasted while your men go after a different set of drill steels every time a different type bit is needed.

Since the driller can switch to the most economical bit as the ground changes, you can get extra drilling economy. And you eliminate the expense of stocking a large inventory of different steels.

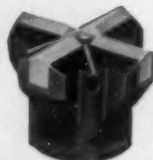
Both Timken multi-use and carbide insert bits give you two important advantages: 1) made from electric furnace Timken alloy steel, 2) special shoulder union that keeps drilling impact from damaging threads.

Our rock bit engineers are experts in cutting drilling costs. They may be able to recommend a bit that will save you money. There's no obligation. Just write to: The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



WHERE YOU CUT COSTS WITH TIMKEN MULTI-USE BITS

Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.



WHERE YOU CUT COSTS WITH TIMKEN CARBIDE INSERT BITS

Give highest speed through hard, abrasive ground. Also most economical for constant-gage holes, small diameter holes, very deep holes.

**... your best bet
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for every job**

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MINING WORLD



THERE ARE GOOD REASONS WHY... THIS ONE BRAND OUTSELLS ALL OTHERS!

It's as true in your business as it is in ours — it takes a consistent record of ever-better performance to stay on top. And USS Tiger Brand Wire Rope has been the largest-selling rope for many years.

There is no secret to this sort of success—it's the result of the right people working with the right facilities. Beginning at U. S. Steel's iron ore mines, our wire rope is quality-produced by an integrated metallurgical service. Tiger Brand ropes are designed by top-notch engineers for best mechanical properties, and are precision-fabricated by the industry's most skilled operators in the world's best rope-making machinery.

Added to this unsurpassed production set-up is a competent order service department and field organization that brings the right rope to your job when you need it, from distributor stocks or custom shipment.

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Please send me your free booklet, "Longer Life From Your Wire Rope" that gives information on use and care of wire rope.

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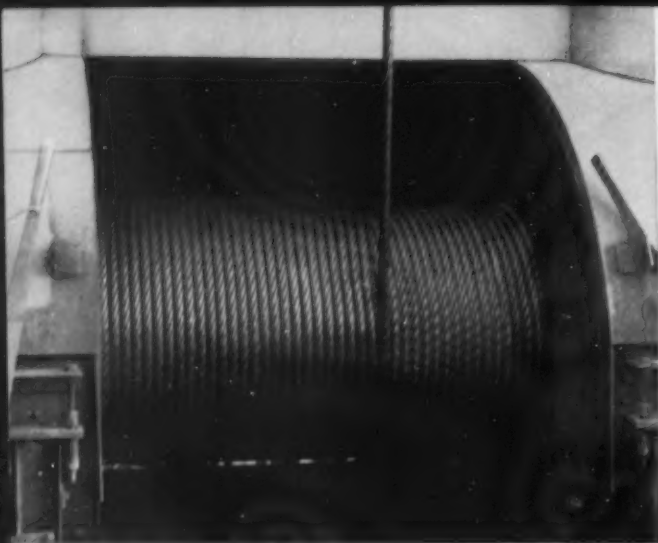
State



USS TIGER BRAND Wire Rope

United States Steel Corporation • Columbia-Geneva Steel Division
In the East: American Steel and Wire Division

UNITED STATES STEEL



OVERCOMING ABRASION—Wire rope takes a beating on some jobs by abrasion. It is squeezed in multiple layers under tremendous pressure on rotary drilling drums in the Texas oil fields. In the Northwest it drags under heavy logs.

In this Arizona mine it is scraped over rocks to operate a slusher. Everywhere it is rubbed severely on winches that do not wind smooth. Under such conditions Red-Strand 6 x 19 Seale wire rope will last longer and save you money.

What can you do better with 6x19 Seale Red-Strand?

6 x 19 Seale has the same strength and weight as the more frequently used 6 x 19 Filler Wire, but the arrangement and size of the wires is different. You can see in the diagrams that the outer wires are fewer in number and larger in size. They provide *high resistance to abrasion* and greater wearing quality with somewhat less flexibility.

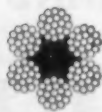
It's the perfect rope for certain jobs. Would it solve a problem for you? Be less trouble? Save more money? A Leschen man is near you. Perhaps he can help. Leschen is providing *longer-than-expected* wire rope service to industry everywhere.

Send for the 64-page Leschen Wire Rope Handbook. It describes Seale and all other Red-Strand wire rope constructions.

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri



6 x 19 Seale



6 x 19 Filler Wire



- Drifts and Crosscuts -

PEP Pointers—The Production Equipment Preview section of MINING WORLD continues to be of growing service to readers. At any rate, more engineers and management personnel are sending in more PEP cards every month. This is natural and proper as more engineers are figuring more ways to cut costs and get more muck out. That is the reason for the PEP card—to help them save time and money. However, in their rush to get the latest bulletin on some intriguing mechanical monster described in the Production Equipment Preview section, a growing number of readers are forgetting to sign their names and addresses. This is just an oversight as they can write, and prove it on the PEP card by asking for more information on that new machine featured on one of the advertising pages. Incidentally this is a unique and special service for MINING WORLD readers whereby they can get special information about any advertisement by filling in the page number of the advertisement, the product, and the name of the manufacturer. This is a quick easy method and it saves the time and trouble of writing a letter to the company. In cooperation with the manufacturers, arrangements have been made to speed to you the information that so many of you ask for every month. Shortly after your PEP card is received a special gummed label with your name and address is sent to the manufacturer with the notation that you are interested in a bulletin, a new catalog, or need additional information. This label can then be used as an address label to save the manufacturer time in sending you the desired information.

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Don't forget that each card is dated and you have 10 weeks to return it. Most advertisers like new fresh inquiries and they hate to have a late request for a bulletin that is just out of print. Cards several years old are received quite often and prove once again that most readers treasure their issues and never throw them away.

So please PRINT your name on the postage free PEP card which can be found every month life-sized on the special colored insert which has proven to be of such value in every issue.

If the Medford, Oregon reader who forgot to print his name and address on the PEP card reproduced here will send it in he will get information on the five items keyed to the numbers that are circled.—You, too, Aurora, Minnesota.

Domestic Developments—Southern California's Mojave Desert region has been the scene of intensive geological study in recent months. First the United States Geological Survey made an investigation of the entire desert area, reportedly in search of saline deposits. This brings to mind lithium which has received so much publicity because of the scientific guess that lithium-six deuteride (Li^6H^2) is a component of the hydrogen bomb. Searless Lake in the northern part of the area is the source of a large amount of lithium. It is recovered from brine as dilithium sodium phosphate by the American Potash & Chemical Corporation. Another important saline product of the area is boron which is growing in importance as a component of special steels and compounds for high temperature service. A zirconium boron compound is reported to have successfully withstood some of the highest temperature blasts such as are encountered in jet and rocket blasts. More recently the United States Atomic Energy Commission made a series of airborne scintillation surveys over the Rosamond and Mojave areas. Several radioactive anomalies indicated by the survey are being investigated by ground work.

Mines and Mines—The absolute and imperative necessity for maintenance of a strong domestic mining industry was never more directly emphasized than by recent mine testimony before Congressional committees. However, in this instance the testimony concerned naval "mines" over which United States Navy officials are "acutely concerned." Their concern is that the coasts of the United States might be blockaded in the next war by foreign mines sown in coastal waters. Naval officers believe that foreign powers have the ability to sow large numbers of all types of mines from submarines. Knowledge of shipping lanes is such that an effective mine blockade could be established. The Navy is doing a great deal of research on this admittedly tough problem, and experts say that the science of mine counter measures must continue to make advances to keep up with the new and complex mines being developed.

Metal Markets—A revolution in mica grading and buying is shaping up. . . . Sheet mica specifications have been changed by a committee of the American Society for Testing Materials. . . . The new specifications eliminate color in determining the usefulness of mica. . . . This will lead to the acceptance of domestic nonruby mica similar to that now enjoyed by imported ruby mica. . . . Provided, of course, that both micas successfully pass the new "Q-Meter" test which sets the electric and other physical characteristics.

Anaconda's Newest Mine—An Exclusive in July

**For
longer
clutch life!**

New Caterpillar oil-type flywheel clutch

now standard in the D8, D7 and D6!

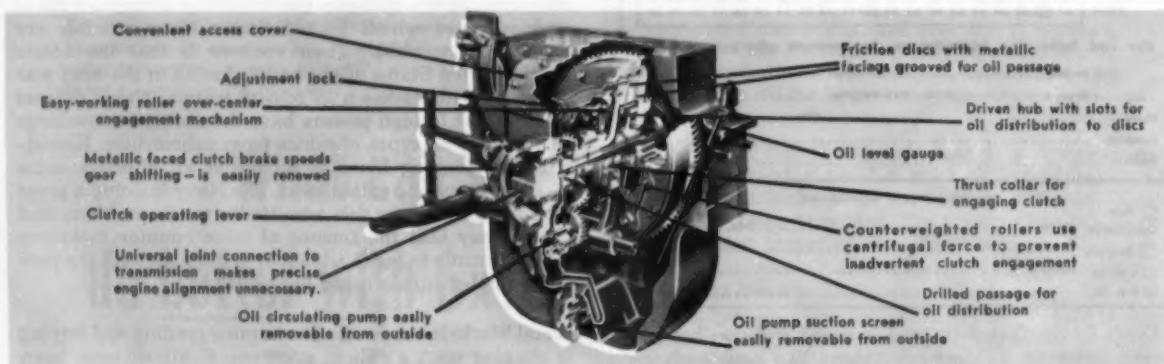
Once again Caterpillar leads the field in an advance that boosts production, cuts down time and lowers operating costs. The new oil-type flywheel clutch, now standard in the Cat® D8, D7 and D6 Tractors, means a new high in money-making performance for you from these three rugged machines. Exhaustive on-the-job tests prove that this clutch lasts many times longer than other clutches under identical conditions. They also prove it enables you to run these tractors two to four times longer before making clutch adjustments.

Here's how it works. The oil system is entirely separate from that of the engine. While the engine is running, the oil pressure flows to all working parts of the clutch. Oil is fed constantly through the radial and circumferential

grooves in the friction discs even when the clutch is engaged, thus cooling the friction discs and pressure plates at all times. As a result, there's minimum opportunity for wear and heating to take place. That's why adjustments are very seldom needed and disc replacement normally required no more often than engine overhauls. For easy access, the clutch has a dirt-proof housing with a big opening at the top—a mechanic doesn't have to disturb engine or transmission to get at it.

Get the whole picture from your Caterpillar Dealer. Remember, he backs all sturdy yellow equipment with genuine parts service—there's never an "orphan" in the Caterpillar line. Ask him to demonstrate on the job!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



New Caterpillar oil-type flywheel clutch gives you greater dependability and lower service and maintenance costs than any other clutch under identical conditions, normal or tough.

CATERPILLAR*

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CAPITOL CONCENTRATES

MALONE SAYS IMC TO BLAME FOR MATERIALS SHORTAGE

Senator George Malone of Nevada has released his subcommittee's report on its investigation of the country's supply of strategic and critical raw materials. In an accompanying statement he charged that the International Materials Conference had had a "serious and derogatory effect" on U. S. stockpiling and defense programs.

Composed of 12 nations, IMC was set up early in 1951 to allocate essential materials among the free nations. Because of the group's activities, Senator Malone said, "artificial shortages were created in the United States." He expressed the opinion that the conference was "at least in part responsible for the policy of making the United States dependent upon foreign nations for the materials without which we cannot fight a war, and for moving our civilian economy to a war economy."

The IMC went out of existence several months ago when the last of its committees ceased to function.

• ODM Begins To Clarify Policy Statement

A partial interpretation of the President's mineral policy of March 26, 1954, is now possible as some definite statements have been made by the Office of Defense Mobilization. The situation at the end of April was about as follows:

1. Long-term mineral stockpile objectives are to be calculated on the assumption that no supplies will be available to us in wartime from foreign sources, except from those countries to which wartime access can be had with the same degree of reliance as afforded by sources within the United States. These objectives are to be met, over and above "minimum" stockpile objectives, by purchases over a long period of time "at advantageous prices."

Lest we become excited, two things must be noted here. For some materials both the present short-term and long-term objectives had been met before the March 26 announcement. Also, the word "advantageous" apparently disposes of any idea of supporting our mining industry by purchases at over-market price.

2. When the plan goes into effect first priority is to be given to those minerals "in which distressed conditions currently exist." Preference will be given to newly mined minerals and metals of domestic origin.

Just how this will be done and at the same time purchase at "advantageous" prices "normally not in excess of prevailing market prices" will have to be explained. For instance, the domestic manganese program pays up to \$2.30 per long ton unit against a market price of \$1.00 per long ton unit. Our tungsten program pays up to \$63.00 per unit against a market price of \$27.00. The market prices of zinc and lead for some time have been below the cost of production at most mines, but the metals are "advantageous" buys for the stockpile at such prices.

3. It has been established definitely that all materials purchased under the long-term program will be frozen in the national stockpiles and that no buffer stockpiles will be set up.

4. There is no guarantee that stockpile objectives for any material will not be reduced as reviews are made

from time to time. During the first six months of 1953, for instance, of 21 materials reviewed, objectives were lowered on eight materials. ODM has stated, "every effort will be made to eliminate avoidable fluctuations in stockpile objectives and in acquisition programs."

5. No plan has yet been formulated to "alleviate distressed conditions" in the mining industry. ODM says that in each case where distressed conditions exist "a specific program will have to be developed." Again, no general rules have been established other than the general policy of acquiring the materials at "advantageous prices" and "normally at prices not in excess of prevailing market prices." ODM further states, "The method of purchase, the prices required, and other factors will have to be determined after thorough consideration of the special situations that exist. . . ."

This holds out small and cold comfort for those who need prompt and substantial support in order to maintain a healthy domestic mining industry.

6. As to the "barter clause" in the policy announcement of March 26, 1954, which anticipates the exchange of our surplus commodities for foreign strategic and critical materials, "no basic policy has as yet been established." However, "care will be taken to avoid interfering with the normal relationships of regular trade in the United States and in friendly foreign countries." Whether barter will be at support-price levels or world price levels no one yet knows, but the difference between the two in many cases will leave room for a lot of expert juggling.

Although it is somewhat early to predict, it appears that those who were enthusiastic about the "new look" in mineral policy on first reading (and it made good first reading) will not be so enthusiastic after studying the original more closely or reading the clarifications now pouring out of the Office of Defense Mobilization.

Certainly the new policy merits careful thought on the part of any mine operator who has any idea of reopening tomorrow. The same is true of anyone contemplating new investments in anything but a metal or mineral with an already known guaranteed program, and the possibility of extensions of these programs should be discounted ahead of time. The government is not happy at having to pay \$63.00 per unit for tungsten it could buy in the world market for \$27.00, among other items.

COMING CONVENTIONS

June 20 through July 3, 1954. Centenary Congress of the SOCIETY DE L'INDUSTRIE MINERALE, Paris, France.

June 25 and 26, 1954. 1954 PACIFIC COAST REGIONAL CONFERENCE ON CLAYS AND CLAY TECHNOLOGY, Berkeley Campus of the University of California.

September 20 to 24th, 1954. Western Division AMERICAN MINING CONGRESS Exposition, San Francisco, California.

September 24, 1954. Fall meeting MINERALS BENEFICIATION DIVISION AIME, Fairmont Hotel, San Francisco, California.

October 5 through 9, 1954. Annual fall meeting INDUSTRIAL MINERALS DIVISION AIME, Lake Placid, New York.

October 18 through 22, 1954. The 42nd NATIONAL SAFETY CONGRESS AND EXPOSITION, Sessions at five hotels in Chicago, Illinois.

October 27, 28, 29, 1954. Third NATIONAL CLAY MINERALS CONFERENCE, Rice Institute, Houston, Texas.

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Suitable for Smelting in Retort
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"BUNKER HILL" brand of refined Pig Lead,
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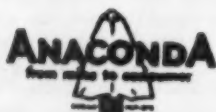
We are proud of our "BUNKER HILL" trade
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metals produced. We likewise strive to
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our employees, with our suppliers of ores
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WET CONCENTRATION?

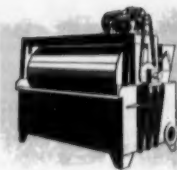
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If these are your problems, you'll want to talk to the Dings people about Wet Concentration. Learn the reasons for, and the operation of, Dings wet belt and wet drum magnetic separators, both electric and non-electric Alnico types—and learn about the new Dings super high intensity models with nearly double the capacity of older units. *Call or write for further information.*



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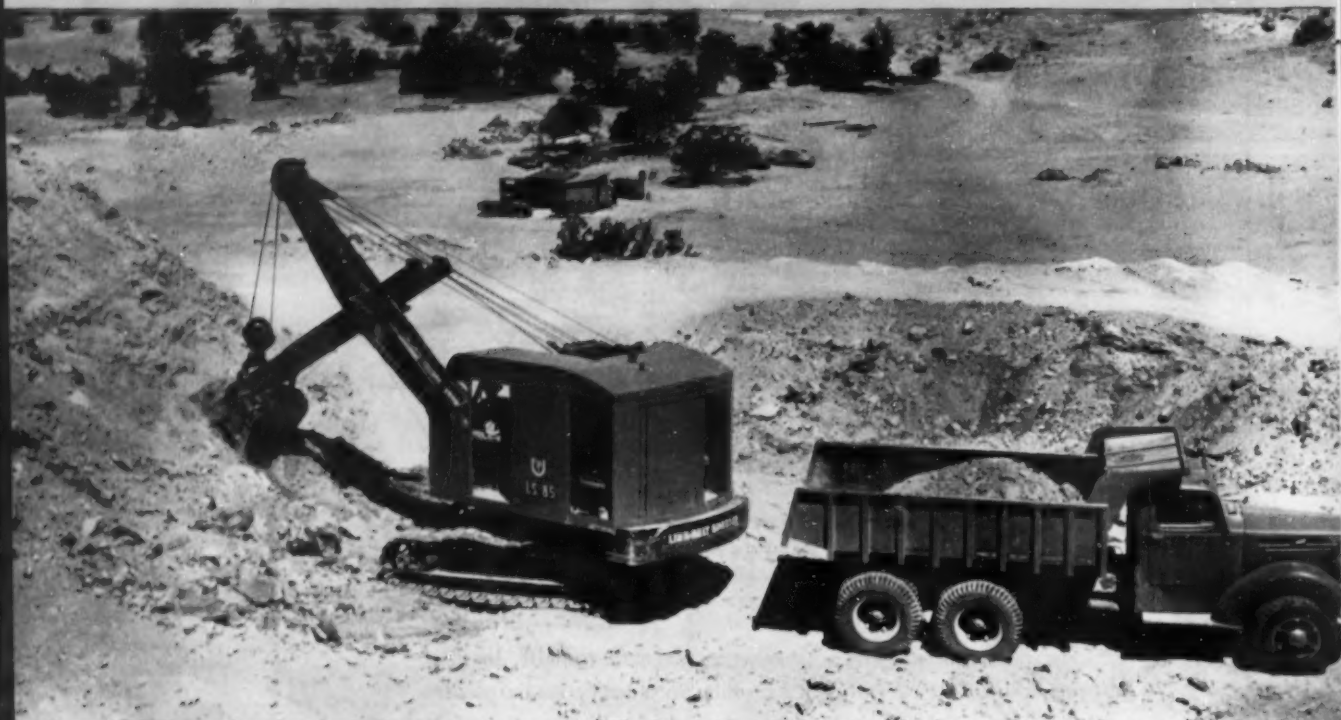
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Magnetic Separation Leader for over Fifty Years

REPORT FROM HAYSTACK MOUNTAIN:

CONDITIONS: "VERY ADVERSE"

PERFORMANCE: "IDEAL POWER... TROUBLE-FREE"



High up on the Continental Divide, this $\frac{3}{4}$ -yard Link-Belt Speeder loads crude uranium ore for Haystack Mountain Development Co. In eight months of week-in, week-out operation through climatic extremes and abrasive dust, its Caterpillar D318 Diesel Engine has needed *no repairs*. Ruggedness and freedom from down time are vital in this remote area, about 15 miles northeast of Prewitt, N. M.

"Our Cat* D318 is the ideal power for this equipment. It has been trouble-free in eight months of operating under very adverse conditions," states J. E. Inman, superintendent.

The Caterpillar D318 can cut *your* operating expenses with low first cost, long and reliable work life, high trade-in value. Like all Caterpillar Engines, it can deliver full power and idle without fouling on money-saving No. 2 furnace oil. The economical D318 pictured here averages only $2\frac{1}{2}$ gallons of fuel per work hour!

There are 12 Caterpillar Engines and Electric Sets, to 500 HP and 315 KW. Your Caterpillar Dealer—who provides fast, dependable service and genuine factory parts—will help you select the power that's "tailor-made" to fit *your* needs. And the next time you order new machinery from mining equipment manufacturers, specify Caterpillar power.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Illinois, U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—©

**SPECIFY CAT POWER
FOR HIGH-PROFIT
PERFORMANCE**

Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

June, 1954

—INTERNATIONAL PANORAMA—

MONTERREY, MEXICO—A new blast furnace has been placed in operation at the Altos Hornas plant to bring annual ingot capacity to 642,000 tons.

MOAB, UTAH—The National Lead Company has started an extensive diamond drilling program at its Big Indian Wash uranium claims south of here.

WASHINGTON, D. C.—Three additional contracts have been negotiated for the production of 19,000 annual tons of titanium metal. The Electro Metallurgical Company, DuPont, and Dow Chemical will supply 10,000, 7,200, and 1,800 tons, respectively.

WINDHOEK, SOUTH WEST AFRICA—The new 100-ton-per-day copper leaching and flotation plant of Industrial Diamonds-Lorelei Copper Mines Ltd. has been placed in operation.

MONTREAL, QUEBEC—The Holannah Company, jointly owned by the M. A. Hanna Company and Hollinger Consolidated Gold Mining Company, has staked promising copper claims on the eastern edge of the Labrador Trough. The companies control the major iron ore deposits of the Trough.

SOUTH STRAFFORD, VERMONT—The Vermont Copper Company, Inc. has agreed to deliver 12,000,000 pounds of refined copper to the United States government during 1954 and 1955. Price for the copper will be 31.06 per pound.

ROCKDALE, TEXAS—The Aluminum Company of America has placed its new 90,000-annual-ton aluminum metal plant in operation here. This plant gives Texas an annual output of 260,000 tons to make it the second largest aluminum-producing state.

MOAB, UTAH—Utex Exploration Company and Combined Metals Reduction Company have formed a new subsidiary—Uranium Reduction Company—to build a new custom uranium ore mill here. Principal source of ore will be Charles Steen's Utex mine.

LIMA, PERU—The Cerro de Pasco Corporation set two all-time zinc production records in 1953. The first was 65,099 tons of zinc in all forms and the second was 9,732 tons of slab zinc.

TWO HARBORS, MINNESOTA—The Great Lakes ore shipping season opened on April 19 when the ore boat Reserve loaded 18,000 tons of taconite pellets from Reserve's Babbitt taconite plant. This was the first time that an entire boatload of pellets had ever been shipped.

SUNNDALSØRA, NORWAY—Aluminum production has been started at Norway's largest aluminum plant here. Annual output of 40,000 tons will not be reached until next year because of power shortage.

TOKYO, JAPAN—Discovery of large chalcopyrite reserves at the Yaso mine of the Sumitomo Metal Mines Company warrants construction of a 250-ton-daily-capacity mill with initial operation in 1954 which may be doubled in size.

MT. ISA, AUSTRALIA—Discoveries of uranium-bearing magnetite have been made in two areas by Mt. Isa Mines Limited.

KIRKLAND LAKE, ONTARIO—Jones and Laughlin Steel Corporation has optioned a large magnetic taconite deposit six miles west of here. Exploration will be started shortly.

JOHANNESBURG, UNION OF SOUTH AFRICA—With reopening of London gold market the Union's gold mines have discontinued selling 40 percent of production on the Free Market. All output is now sold to South African Reserve Bank for marketing in London and elsewhere wherever markets are most advantageous.

PORT ANGELO, MEXICO—Republic Steel Corporation is developing an important rutile deposit 30 miles east of here. Republic engineers believe that it is one of the largest in the Western Hemisphere.

Republic Steel Acquires Mexican Rutile Deposit

Republic Steel Corporation has acquired what may be the largest deposit of rutile, a titanium-bearing mineral, to have been discovered in the Western Hemisphere to date. The deposit is located in the extreme south of Mexico, in the province of Oaxaca, about 30 miles from Port Angelo on the Pacific Coast.

About a million tons of crude ore containing rutile in various degrees of purity are estimated to be on hand. Test drillings have been made and an adit almost 200 feet long has been blasted into the heart of the deposit.

Engineers report that the deposit is readily mineable by underground methods and that no unusual transportation problems exist despite the rugged terrain. Concentration of the ore will probably be done at or near the mine. Since Republic does not engage in initial reduction of the ore to "sponge," it will probably be contracted out to one of the present producers.

Pronto Uranium Awards Shaft-Sinking Contract

Pronto Uranium Mines Limited has let a contract for the sinking of a three-compartment, 575-foot shaft on its Algoma property in Ontario. The work was awarded as a joint contract to the Temiskaming Construction Company and Inspiration Mining & Development Company Ltd., with shaft sinking expected to get under way quickly.

The contract calls for the establishing of stations and shaft crosscuts at four levels. It also includes establishment of an ore and waste pass system for the handling of 1,000 tons or better daily. Some basic lateral development work will also be done.

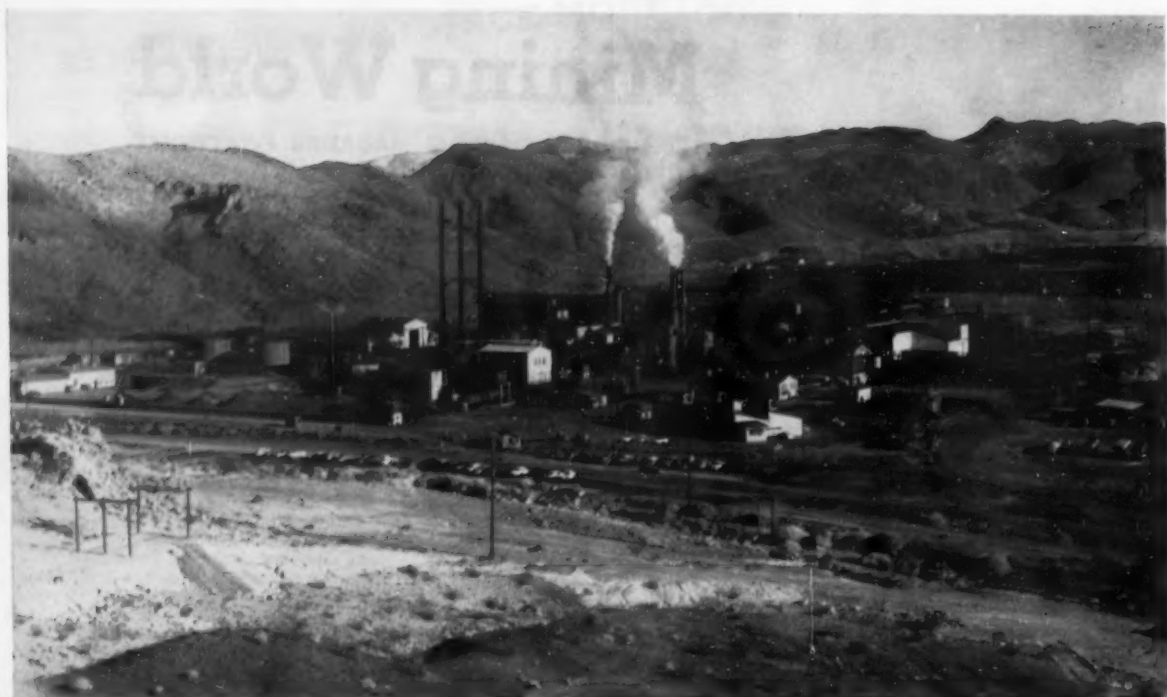
The company has three drills in operation—two working within the main central ore area, and one engaged in exploration work on the Pronto east property immediately east of the Pater ground.

New GSA Copper Contract Signed by Vermont Firm

Vermont Copper Company, Inc., has just signed a new contract with the General Services Administration, calling for delivery of 12,000,000 pounds of refined copper to the government at 31.06 cents per pound by the end of 1955.

The contract serves as an extension of an agreement signed April 1953 which provides for delivery of 8,000,000 pounds of copper by June 30. The new contract will begin July 1 and run through December 31, 1955 or earlier if full production has been achieved.

Ore will be taken from the firm's Elizabeth mine, located in Orange County, Vermont.



Layout of Manganese Inc.'s plant at Henderson, Nevada. Ore trucked from open pit mine in background is bed-

ded in blend piles. New mill, right center, supplies flotation concentrates to calcine, nodulizing kilns in center.

Manganese Inc. Rebuilds Following Fire

Successful application of new techniques makes this operation an important contributor to the nation's stockpile of manganese nodules

Early in June of last year, a fire destroyed the 1,200-ton flotation mill of Manganese Inc. before the mill had reached its full

production capacity. Within seven months, a new, modern, fire-proof flotation plant had been erected and was in operation.

MINING WORLD has covered the complete story of this Nevada operation and presents it here in four sections. Ed.

Manganese, Inc.'s Staff

H. S. West	President
F. A. McGonigle	Vice President and General Manager
S. J. McCarroll	General Superintendent
John M. West	Assistant to General Superintendent
Victor Howard	Mine Superintendent
John T. Atkins	Chief Mine Engineer
George Laughton	Isbell Superintendent
John Anderson	Mill Superintendent
Claude Davis	Kiln Superintendent
Russel M. Waters	Chief Engineer
W. N. Campbell	Personnel Director
Walter Barney	Master Mechanic
Robert Raichlen	Electrical Superintendent
Vernon Berl	Traffic Superintendent

Engineering talent, adequate capital, determined and resourceful management, and a ready market for the product have all been combined by Manganese, Inc. to make a mine and plant which is unique—from the Three Kids open-pit mine near Henderson, Nevada, to the final product—a high-grade manganese nodule.

First operated in 1952, the plant has gone through a series of heart-breaking setbacks and disasters, but a live-wire staff put their heads together, and collectively have placed

MINING WORLD

a modern and well-managed plant back in operation following a break in the middle of the nodulizing kiln in February 1953, and a fire which destroyed the 1,200-ton flotation mill in June 1953.

Before taking a look at the mine and plant, let's review the geology of the district, for the physical characteristics and mineral associations of the ore itself account for many of the problems which had to be overcome.

The manganese beds lie near the base of the Muddy River series, a formation made up of gypsum, red shales, clays, tuffs, and sandstones. The sedimentary rocks of the series were deposited in a basin created by faulting and tilting of the underlying volcanics.

The ore, varying in thickness from 10 to 75 feet, is made up of porous black to brown earthy wad, a hydrous manganese oxide of indefinite composition.

Faulting

At the Three Kids mine, the area is bounded by north to northwest striking faults. On the west is the east dipping Lowney fault and the Extension series cut off the ore body on the east. The down dropped block between these two structures is further broken by the north striking Annex fault, which displaced the manganese beds 8 feet downward on its east side. West of the Annex fault the ore forms a syncline plunging to the north. The southern half of this syncline will form the "A" pit which the company is now stripping. As the depth of overburden increases to the north, it is planned to work the ore body by underground methods. The "B" pit comprises most of the area between the Annex and the Extension faults. Much of the overburden and a large portion of the ore in this area was stripped and mined by the M. A. Hanna company during World War II.

JUNE, 1954

Formula for Success



DYNAMIC LEADERSHIP, represented by (left to right) H. S. West, president, F. A. McGonigle, vice president and general manager, and S. J. McCarroll, general superintendent, provides the driving force behind Manganese Inc.'s operations.

ENGINEERING SKILL was scientifically employed to attack problems and provide solutions. These two ingredients—leadership and skill—add up to provide a successful method for upgrading a low grade deposit. During each period of national emergency, other operators had attempted to work the property, but the results obtained would not sustain a peace time project. Today Manganese Inc. has a going economic enterprise.

New methods and new techniques had to be developed to combat operating problems. Here are some of the outstanding features of the plant.

At the Mine:

- Use of rotary drill rigs and breaking rock to cuts made with millisecond delay blasting caps.
- Blending of mill feed concurrent with mining to obtain better mill control.

At the Mill:

- Flotation process worked out by Robert Lord of Southwestern Engineering Company before it was determined whether it would be economically possible to work the deposit.
- U. S. Bureau of Mines cooperated with the company in experimental work at its pilot plant in Boulder City, Nevada.
- Use of a Cedar Rapids impact breaker in the crushing circuits.
- Use of shop-made cyclones in the grinding circuit to overcome classification problems.
- Close control of feed tonnage and quantity of reagents used through Merrick feedweights and metering pumps.
- Conditioning in a bank of Fagergren 66-inch flotation cells in which the air supply has been shut off.
- Use of soap flotation in which reagents are fed in an emulsified form.
- A large consumption of flotation reagents.
- Use of cyclones to partially dewater cleaned concentrate.
- Use of pilot lights on all concealed equipment so that operators can tell at a glance if equipment is functioning.

At the Nodulizing Plant:

- Use of two calcine kilns, operating in parallel, ahead of the nodulizing kiln to preheat the feed and drive off a huge amount of flotation reagents; the concentrate fed to the nodulizing plant contains 40 to 45 per cent volatile material.
- Use of variable speed motors on kiln drives to control loads handled at the burning plant.
- High moisture content of feed.
- Removal of undesirable lead minerals by fuming.

[World Mining Section—31]



Ore is mined at Manganese Inc.'s "B" pit shown in foreground while stripping proceeds at "A" pit.

Mining Moist Spongy Ore Requires—

A switch to rotary drilling and development of new drill pattern; irregular manganese values necessitate blending of mill feed

Ore from Manganese, Inc.'s Three Kids mine is stripped and mined under contract by the Isbell Construction Company of Reno, Nevada. Stripping operations are currently under way at the "A" pit while ore is being mined at the "B" pit. George Laughten superintends Isbell's operations, while engineering and control of mining operations are done by Manganese, Inc.'s mine staff, headed by Victor Howard.

The extremely porous and spongy condition of the black manganese ore, along with the high moisture content of the rock, has necessitated some departure from standard methods of mining, and a development of methods to overcome the peculiarities of the ground.

Rotary Drill Prevents "Mud Up"

Drilling was formerly done by wagon drills, but here the inherent 18 percent moisture content created a problem. Drill cuttings tended to "mud up" and change to a rubber-like consistency, making it difficult to recover cuttings. Isbell soon switched to a Joy 225 A rotary drill, and is now drilling dry with an overall increase in footage and saving in time. The drill and a 40-foot mast are mounted on a diamond T8 truck chassis. Air for the rotary drill, which puts down a 4 3/4-inch hole, is supplied by a Joy 640 cubic-foot-per-minute compressor; also mounted on the truck is a dust collecting system.

Footage per drill shift averages about 600 feet in ore, and drops to about 350 to 450 feet in volcanic tuffs and gypsum wastes. Both Varel rock bits and Varel finger bits are used; life of the rock bit is 3,000 feet, while 1,500 to 1,800 feet are obtained with the finger bit. Rock bits, however, are about 4.7 times as expensive as the finger bits, so drilling is done with the latter wherever possible.

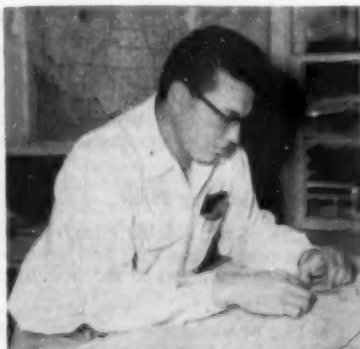
Blasting Method

An interesting and unusual blasting method has been developed to provide better fragmentation of the ore. Conventional bench blasting produced large slabs because of the spongy nature of the ground. To

overcome the situation, a drill pattern was devised whereby a center cut was blasted on each bench. Successive rings of holes around the center cut broke ground into the hole produced by the cut, rather than to the face of the bench. By breaking to the center, rock was further pulverized and broken, producing optimum fragmentation. Holes are spaced on 8- to 9-foot centers and electric delay blasting caps are used to time the blast. Number 0 caps are used to produce the center cut, while number 4 delays are used in the next ring. Number 6 caps are used in the outside ring of holes.

Loading of Holes

Decked charges also aid fragmentation, since blasting a hole from the bottom tends to produce large blocks. Holes are primed with two 1 1/2 by 8-inch sticks of 60 percent powder and electric caps. One half bag of Flodyn 40 percent free-flowing bag powder is poured over the primers. On top of this is placed a foot or so of crushed rock. The remainder of the hole is loaded with alternating decks of 30 percent Atlas 4- by 16-inch cartridges and bag powder to within 6 or 8 feet of the collar of the hole. Primacord, used for the full length of the hole, carries the detonation through the decked charges. The use of primacord also serves as a safety factor, since it can be used to set off missed



John Atkins, chief mine engineer, checks map of open pit at Three Kids Mine.

[World Mining Section—32]

MINING WORLD



2,350 pound drop-ball mounted on Northwest shovel is used for secondary at mill blend pile.

holes. Powder factor is one pound per ton of rock.

Ore Spread on Blending Piles

Broken rock is handled by a model 80 Northwest shovel with a 2½-yard dipper. The shovel, equipped with a Murphy Diesel engine, loads the ore on 9.7-cubic-yard Euclid trucks. Ore is hauled half a mile to the mill and dumped on a blending pile where a Caterpillar D6 bulldozer spreads it in layers 1½ to 2 feet thick. Chunks of rock too large to be spread evenly over the surface of the stockpile are broken by a drop ball. A Model 25 Northwest shovel, fitted with a 35-foot boom, suspends the 2,350-pound weight used for secondary breaking. By alternate raising and dropping of the weight, boulders are broken to size.

Trucks to Three Stockpiles

Loaded trucks are sampled at a weighing station before the ore is stockpiled. At present, the cutoff grade at the mill is 15 percent Mn, and ore of this content or better is taken to the mill feed stockpile. Rock assaying 10 to 15 percent Mn is stored in a second stockpile and low-grade (5 to 10 percent Mn) is routed to a third stockpile. With improvements in milling methods or economic conditions, it may be possible to treat the low-grade material at a profit sometime in the future. The sampler in charge of the weighing station can, after some experience, judge the Mn content of ore on the trucks within 1 or 2 per-

cent, and route them to the appropriate stockpile. At present there are 50,000 tons of sub-ore in the medium-grade pile and 40,000 tons in the low-grade reserve.

Why Blend?

The flotation of manganese oxide ores involves many unknown factors and variables, more so than the flotation of other non-ferrous minerals and nonmetallics. The process is still very much an art, and therefore, every effort is taken to eliminate as many variables as possible. Since the ore in different seams varies in composition quite widely and milling is a sensitive operation, mill feed is bedded in layers on the stockpiles. A Model 6 Northwest 1½-yard shovel scoops the ore from the blending pile and loads it on Euclid trucks which dump into the 200-ton course ore bin. Shovel bites are taken through several layers of the ore thereby controlling mill feed composition.

Manganese content is held nearly constant and the quantity of sul-

phates, lead, and clays are held below certain limits. Lead in the crude ore runs about 1 percent, and after concentration amounts to 2 to 3 percent. Since nodule specifications of less than 1 percent combined copper, lead, and zinc must be met, close control must be maintained over the quantity of lead in the feed. Sulphates in the stockpile should be maintained at less than 4 percent, since they float quite readily in the milling operation and create excessive volumes of SO₂ gases in the kilns during the nodulizing process.

Stripping Ratio At Mine

Overall stripping ratio will be 0.92 cubic yards per ton of ore. The low figure results from the fact that the M. A. Hanna Company stripped much of the overburden from what is now the "B" pit. During the final stages of mining at the "A" pit, however, stripping ratios will approach 2.8 cubic yards per ton of ore. At present 200,000 tons of ore remain to be mined in the "B" pit.



A Northwest model 80 shovel cleans up following a blast and loads a 9.7 yard Euclid truck. Ore, following sampling, is routed to the mill feed blend pile or one of the low grade stockpiles for storage.



Use of Joy 225A rotary drill, shown above, has meant increased footage per drill shift. Wagon drills, formerly employed, produced cuttings which tended to "mud-up" and plug the steel.



New Mill Features Use of Cyclones— Soap Flotation

Flotation roughers and cleaners are shown in the above picture. Grate decks and a liberal use of sumps provide for an easily cleaned mill.

Manganese Inc.'s new \$1,000,000 mill, rebuilt in seven months' time, replaces the old wooden structure destroyed by fire in June 1953. Roof trusses and columns are of steel construction, while corrugated galvanized siding was employed to enclose the structure.

Manganese, Inc. is a pioneer in the field of treating manganese oxide ores. Many improvements in construction and design based on past operating experience and knowledge were used. Conditioning facilities were doubled in the 1200-ton mill, and two more banks of flotation cells were installed to treat middlings products. Cyclones were installed ahead of the filters to partially dewater flotation concentrates.

Salvage Task

Following the fire, mill crews began the task of re-claiming usable motors and equipment, and clearing the area for construction. The two rod mills and motors were salvaged, along with approximately 90 percent of the motors on the flotation cells. Four banks of flotation cells were completely destroyed. The re-

mainder of the equipment was rebuilt as long as it was considered usable. Manufacturers cooperated completely and many motors and equipment parts were rebuilt for about a third of the original cost.

Modern Mill

Featured in the new mill is the use of constant lighting which characterizes design and operating considerations of today's plant construction. No windows are used in the flotation section, and incandescent lighting provides light of a constant intensity for operators. Grate decks will provide for an easily cleaned mill, and a liberal use of sumps takes much of the work out of cleaning up following spills. Pilot lights are placed on all concealed equipment and froth paddles, so that operators may tell at a glance whether or not equipment is operating.

The grinding section was designed so that all units could be started from one station. Motor controls for rod mills and classifiers are located next to a master valve controlling the water added to the feed end

and discharge end of the mills.

Quick Wiring Job

One important factor leading to the rapid reconstruction of the mill, was that the electrical department, headed by Bob Raichlen, took only three weeks to complete a 60-day job under ordinary conditions.

Essentially the problem was to have motors moved in and the wiring system connected at the same time that mill construction was finished. Many of the units were fabricated and connected in the electrical shop during the construction stage. Component parts which had been previously prefabricated were then installed as units in the mill as soon as conditions permitted.

Power is brought in at 69,000 volts and stepped down to 2,400 volts for interplant distribution at the main substation. Three secondary substations serve the crushing plant, the flotation section, and the kiln plant. The jaw crusher and rod mill motors operate on 2,400 volts while the remainder of the plant utilizes 440 volt current.

Each of the two mill circuits are

wired separately, so that one section at least can be operated while the other is down for repairs. The mill is characterized by a notable absence of conduit. Expanded metal troughs were dropped down on roof columns with square duct, and motors tied to conduit by four wire neoprene jacketed cable.

Soap Flotation

The flotation process involves conditioning with sulfurous acid, which serves as an activator, and soap flotation.

Grinding and flotation are carried out in two separate identical 600-ton circuits. The flowsheet incorporates two-stage crushing, followed by grinding in closed circuit with Akins spiral classifiers and 12-inch cyclones designed by S. J. McCarroll, General Superintendent. Pulp overflowing from the cyclones at 21 percent solids in each circuit is conditioned in Fagergren 66-inch cells in which the air supply has been sealed off. Conditioned feed goes to the flotation section which includes for each circuit: (1) flotation in a 7-cell bank of machines (2) four-stage cleaning; (3) a four cell middling treatment step. Cleaned concentrate is filtered on Oliver 10 leaf filters following partial dewatering by cyclones.

Cedar Rapids Breaker

Primary crushing to a 5-inch size is carried out in a Traylor 30- by 42-inch jaw crusher. The discharge is scalped on a Symons 4- by 8-foot rod deck screen, and the plus ½-inch oversize is fed to a Cedar Rapids double impact breaker. Use of cone crushers on the spongy moist ores was found to be unsatisfactory due to the packing effect in the mantle. (Run of mine ore contains 18 percent water and ore from the stockpile contains about 12 percent) The ore is unusual in that even though it contains a large amount of moisture it still presents a dust problem. A Sly dust collecting unit handles the problem quite adequately. Undersize from the scalping screen joins the breaker discharge, and is stored in bedding bins.

Rod deck screens fed through Merrick feedweights (installed to smooth out fluctuations in material flow) remove minus ¼-inch particles from the ore entering the rod mills. Screen oversize is fed directly to the rod mills, while undersize goes to the classifiers.

Cyclones Solve a Problem

Classification of the 7 by 10-foot



John Anderson, mill superintendent, has charge of a well-designed concentrator at Manganese Inc.

Marcy rod mill discharge proved a serious problem. Agitation by classifier rakes caused bentonite (a clay which expands 20 times when wet) to mechanically lock up many fine particles. The porous low-density ore settled quite slowly in classifier pools so that a poor overflow product was obtained. The installation of four cyclones in each section of the mill helped to achieve better classification. Each grinding circuit now consists of a Marcy rod mill which discharges to a 78"-Akins classifier. Classifier overflow running 40 to 42 percent solids is pumped to and distributed to the cyclones. Cyclone overflow at 21 percent solids and 75 percent minus-200-mesh is fed to the condi-

tioners. Underflow is recirculated and joins the rod mill feed.

Reagent Functions

Dry soda ash is added to the pulp before it enters the cyclones. This reagent is used primarily as a water conditioner and not for pH control (pH in the process has not been found to be a critical factor and generally ranges between 7.8 to 8.6). It is believed that calcium dissolved during grinding (from the gypsum in the ore) is precipitated by the carbonate ions and thus the formation of insoluble calcium soaps is reduced, cutting down on excessive reagent consumption.

Sulphur dioxide in a 3.0 percent water solution, is added to the cyclone overflow. Its function is primarily that of an activator in that it seems to condition the surface of the manganese oxide particles, possibly by the formation of a manganese sulphate surface on the particle. A soap emulsion added just ahead of the pulp conditioning step serves as a collector and frother.

The emulsion is a water suspension of soap skimmings (a by-product of the sulphate paper industry), Diesel oil, and oronite. The dry reagent proportion of the collector is 71.8 percent Diesel oil, 26.1 percent soap, and 2.1 percent oronite. The emulsion is diluted and fed at 20 percent strength through metering pumps and rate indicators. Consumption of the collector is huge and has averaged over 250 pounds per ton of feed.



This modern, fireproof, flotation concentrator furnishes plus 40 percent concentrates for Manganese Inc.'s nodulizing plant. Reagent storage tank, in right foreground, stores soap emulsion used in process.

Conditioning is carried out in 23 Fagergren 66-inch cells, (2 eight-cell banks operated in parallel feed one seven-cell bank of machines), in each circuit. Sixteen cells operate with rotors only while the last seven cells incorporate both rotors and stators. Retention time in the conditioning stage is about 15 minutes.

Cyclones Dewater Concentrate

Another unique feature of the mill is the fact that it has not been possible to utilize thickeners on mill concentrates. Because of the excessive amount of oils used in the flotation process, concentrates tend to agglomerate and form large flocs and balls when agitated by the raking mechanism of thickeners. To overcome this effect and to reduce the load on the filters, four cyclones were installed ahead of the two Oliver filters serving each mill section. Pulp enters the cyclones at 25 percent solids and thickened underflow is discharged to the filters at 35 percent solids. Cyclone overflow is pumped to a 120-foot Dorr traction thickener. Thickener underflow is recycled to the filters. Filters have been operated successfully on mill concentrates at 12 percent solids, but it has been found that the cyclones, by partially dewatering the pulp, greatly increases the filter capacity.

An interesting sidelight on the use of cyclones in the mill at Mangane Inc. is their mode of construction. They are made in company shops by bolting 3 sections of standard flanged pipe reducers to a short 12-inch section of pipe. Starting at the top, a 12-inch length of pipe, 12 inches in diameter, is bolted to a standard 12- to 6-inch pipe reducer. This section is fitted with a 6- to 3-inch reducer and then a 3-



Cyclones, installed in the grinding circuit, produce a 75 percent minus 200-mesh overflow.

to 1½-inch pipe reducer is attached. For control of classification several metal discs with various sized orifices have been made which are inserted between the cyclone and the underflow pipe coupling.

Reagents—Tonages Closely Controlled

Surface studies of the porous ore indicate a tremendous surface area. Calculations made, have shown the surface area of rod mill discharge to approximate 57 square meters per gram (13,000 acres per ton) and this fact alone accounts for much of the huge reagent consumption.

Soap flotation is quite sensitive to the frother action obtained. Too

much reagent flattens the froth and creates a scum with a consequent loss of cleaning action on bubble surfaces. On the other hand, too little reagent creates a large volume of watery froth with little mineral pulled up with it. This factor necessitates close control of the reagents and quantity of mill feed to eliminate, as far as possible, wide fluctuations. In the old mill trouble was experienced in maintaining a constant feed tonnage but Merrick Feedweights installed ahead of the rod mills seem to have eliminated this source of trouble. Flowmeters and rate indicators are used extensively throughout the mill. Reagents are fed by means of metering pumps to maintain control of flotation properties.

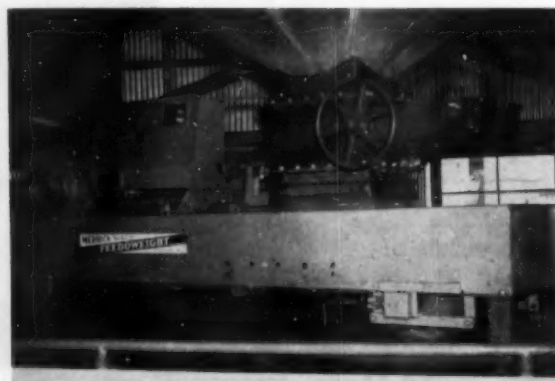
Reagent Mixing

The soap emulsion used in the concentrator is made up in a separate plant. Diesel oil, soap skimmings, and oronite shipped to the plant are stored in tanks of 200,000-gallon, 100,000-gallon, and 25,000-gallon capacities, respectively. Oronite and soap skimmings are mixed with water to form a 50 percent suspension in Denver conditioners. Diesel oil is added, and the emulsion, diluted to 20 percent strength, is pumped to a 42,000-gallon storage reservoir at the mill.

At the time of MINING WORLD's visit in February, mill heads were about 20 percent manganese and recovery was about 80 percent. Both the grade of concentrate and recovery are sensitive to the grade of feed. With a 20 percent feed, the concentrate grade was slightly better than 40 percent. Nodulizing the concentrates with the subsequent loss of ignition products up-grades the product 5 to 7 percent in manganese content.



Installation of Merrick Feedweights (right) ahead of the rod mills (left) solved a fluctuating feed-rate problem.



lem at Manganese Inc.'s mill. Compact grinding section can be started from one station.

Flowsheet of Manganese, Inc.'s 1,200 Ton Manganese Flotation Mill & Nodulizing Plant

Henderson, Nevada

(Flowsheet units with double lines represent two such units in plant)

Crushing and Grinding Section

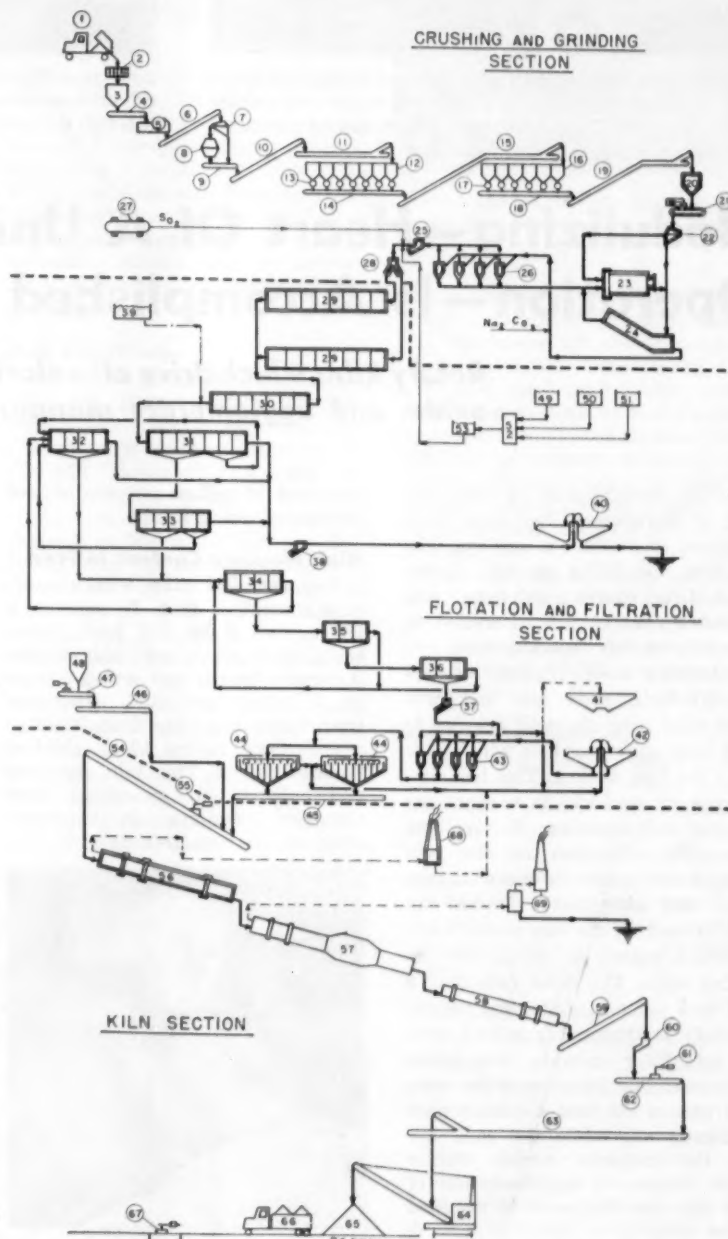
1. Ore trucks from mine.
2. Rail grizzly, 27" spacing.
3. Coarse ore bin.
4. Pan feeder, 54", Stephens-Adamson.
5. Jaw crusher 30" x 42", Traylor Mfg. Co.
6. Belt conveyor, 30", Conveyco.
7. Rod-Deck screen, 4' x 8', Symons.
8. Impact Breaker, 30" x 30", Iowa Mfg. Co.
9. Belt conveyor, 24", Conveyco.
10. Belt conveyor, 24", Conveyco.
11. Belt conveyor, 24", Conveyco, tripper Stephens-Adamson.
12. Blending bins, 300 long tons.
13. Feedometers, Hardinge.
14. Belt conveyor, 20", Conveyco.
15. Belt conveyor, 20", Conveyco, tripper Stephens-Adamson.
16. Bedding bins, 150 long tons.
17. Rotary feeders, 18" x 12" x 3/4", Link Belt.
18. Belt conveyor, 20", Conveyco.
19. Belt conveyor, 20", Conveyco, tripper Stephens-Adamson.
20. Rod mill storage bins, round, steel, 18' x 20' (2).
21. Feedweight, 20" Merrick (2).
22. Rod-Deck screen, 3' x 6', Symons (2).
23. Rod mills, 7' x 10', Marcy (2).
24. Classifiers, 78", Atkins (2).
25. Samplers, 24", Geary Jennings (2).
26. Cyclones, 12" (2).
27. SO₂ storage tank.

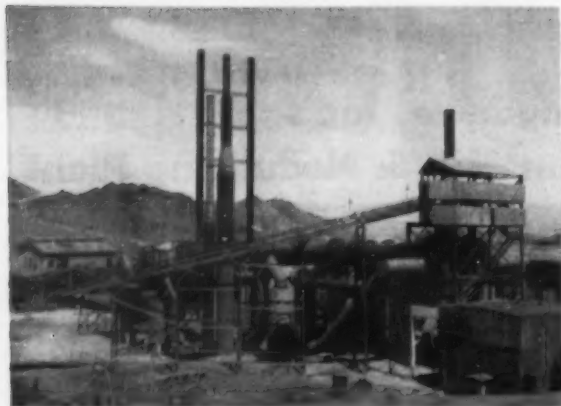
Flotation and Filtration Section

28. Splitter boxes (2).
29. Conditioners, 8 Cell, Fagergren (2).
30. Rougher conditioners, 7 cell, Fagergren (2).
31. Roughers, 7 cell, Fagergren (2).
32. Middlings cleaners, 4 cell, Fagergren (2).
33. 1st cleaner, 5 cell, Fagergren (2).
34. 2nd cleaner, 4 cell, Fagergren (2).
35. 3rd cleaner, 3 cell, Fagergren (2).
36. 4th cleaner, 3 cell, Fagergren (2).
37. Concentrate samplers, Geary Jennings (2).
38. Tailing samplers, Geary Jennings (2).
39. Mill water storage & steady head tank.
40. Tails thickener 160' dia., Dorcco.
41. Concentrate storage tank.
42. Concentrate thickener, 120' dia., Dorcco.
43. Cyclones, 12" (2).
44. Filters, 8'-6" x 10' Leaf, Oliver, American (2).
45. Belt conveyor, 24".
46. Belt conveyor, 12".
47. Feedometer, Hardinge.
48. Coke storage bin, round, steel.
49. Soap storage tank.
50. Oil storage tank.
51. Oronite storage tank.
52. Emulsifying and metering equipment.
53. Emulsion storage tank.

Kiln Section

54. Belt conveyor, 24".
55. Weightometer, Merrick.
56. Calcine kilns, 8' x 150' (2).
57. Nodulizing kiln, 10' x 150'.
58. Rotary cooler, 8' x 96'.
59. Pan conveyor, 18".
60. Nodule sampler, Denver Snyder.
61. Weightometer, Merrick.
62. Belt conveyor, 18".
63. Belt conveyor, 18".
64. Stacking conveyor, 18".
65. Nodule pile.
66. Nodule hauling to R.R. siding.
67. Truck scale.
68. Calcine kiln dust scrubber.
69. Nodule primary & secondary scrubbers & lead recovery.





Conveyor in foreground (left) elevates manganese flotation concentrates which are then fed to the two calcine kilns. The nodulizing kiln (right) contains an expanded



zone near the discharge end for preheating and fuming off unwanted lead oxide from the feed. Calcine passes through the nodulizing kiln in about one hour.

Nodulizing — Heart Of A Unique Operation — Is Accomplished By

Rotary kilns which drive off volatile material, fume off lead oxide, and agglomerate manganese flotation concentrates

So far operations at the mine and mill of Manganese, Inc. have been designed to produce a uniform feed for the nodulizing section of the plant. Lead content, sulphates, and insoluble content are controlled to maintain nodule specifications.

Petroleum coke, crushed to minus-3/8-inch, soda ash and wet filter cake from the mill are fed to a 25-inch conveyor belt which elevates the feed 60 feet. This belt discharges its contents to a short reversing belt feeding the calcine kilns. The direction of the belt changes automatically every 22 seconds, and alternately diverts the feed to each of the two screw feeders which augers the charge into the calcine kilns. The coke (amounting to 3 to 5 percent of the dry weight of feed) is thoroughly mixed with the wet filter cake by the screw conveyors. The function of the coke is to reduce the lead so that it may be fumed off, while the soda ash aids the incipient surface fusion which results in agglomeration of feed into nodules as it is tumbled in the kiln.

All kilns are fired with Bunker C fuel oil. Oil consumption is 2 gallons per ton of feed for each calcine

kiln and 10 gallons per ton of feed in the nodulizing kiln.

High Moisture Content in Feed

The wet filter cake, with a moisture content of 30 to 35 percent, is fed to two 8 by 150 foot calcine kilns, each equipped with a Pan American burner and set on a slope of 7/16-inch per foot. Discharge from the calcine kilns drops through a dust hood to the 10-by 150-foot nodulizing kiln. This kiln, designed and built by the Standard Steel Company, contains an expanded zone which measures 11½ feet in

diameter by 20 feet in length, 20 feet from the firing end.

The function of the belly was to serve as a retention zone to preheat the charge for nodulizing, and fume off the lead content of the calcined concentrates.

Feed enters the calcine kilns where the temperature ranges in the neighborhood of 600° to 950° F.; the product is discharged at 800° to 1,000° F. Combustible products and flotation reagents are driven off in the calcine kilns, and the charge is preheated for the nodulizing kiln.

Nodulizing Kiln

The nodulizing kiln, fired at the discharge end by two Coen oil burners operating at 500 pounds per square inch pressure, is mounted on three tires. Hot calcine entering the feed end at approximately 1,000° F., passes through the kiln in about one hour. Theoretically, about midway in the kiln where the temperatures reach 1,600° F., lead reduced by the coke in the feed begins to be fumed as an oxide. Sulphur dioxide gases liberated from gypsum react with some of the fumed lead oxide to form lead sulphate. Calcine is nodulized as it passes the enlarged section, and drops to the rotary cooler at about 2,000° F.



Russell Waters, plant engineer, checks equipment specifications for new installations.

[World Mining Section—38]

MINING WORLD

In actual practice, exothermic reactions taking place someplace midway in the kiln cause temperatures to rise higher than desired, and nodulizing begins probably 70 or 80 feet from the burner end. The lack of control over the temperatures in the kiln creates a building up of caked calcine on the wall of the kiln in the expanded zone. Thus many of the advantages of the enlarged section are lost.

Boring Bar

The pasty calcine is dislodged and barred off by means of a 40-foot boring bar containing a knife edge which is inserted at 4-hour intervals. The bar, 20-inches in diameter, contains a 14-inch inner pipe through which cooling water is fed and recirculated along its outer side.

Life of the lining is much longer in the nodulizing kiln than in either the calcine kilns or rotary cooler, due to the buildup of pasty calcine on the walls. The latter are lined with triple-burned, high abrasive-resistant alumina brick 6 by 6 by 4-inches. Wear at the feed end of the calcine kiln is higher than at any other point in the plant.

Speed Range For Kiln Drives

For flexibility, the calcine and nodulizing kilns are equipped with variable-speed motors. Under normal operating conditions, feed from the mill passes through the calcine kilns in one hour, spends another hour in the nodulizing kiln, and passes through the cooler in an hour. To prevent overloading, the drive motor output on the calcine kilns can be varied from 18 to 50 horsepower, giving a range of speed selections $\frac{1}{4}$ to $1\frac{3}{4}$ revolutions per minute. Horsepower rating of the drive on the nodulizing kiln can be varied from 25 to 75 allowing a speed range of $\frac{1}{4}$ to 2 rpm. Normally this kiln operates at $1\frac{1}{2}$ revolutions per minute.

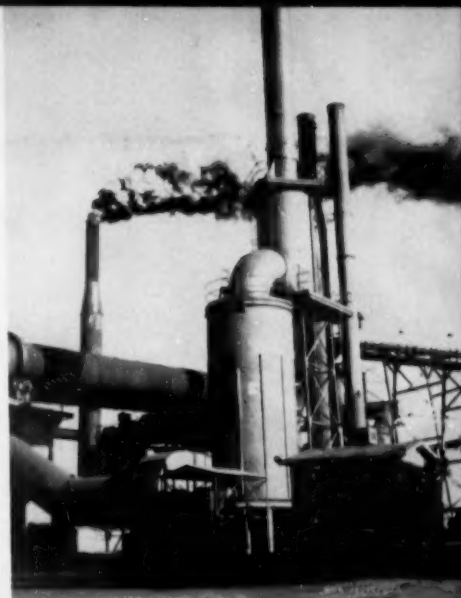
Load handled by the plant is maintained by the appearance of the nodules and cake at the discharge end of the nodulizing kilns. The operator here has Honeywell temperature recorders and optical pyrometers which measure kiln temperatures, and a Brown temperature recorder which measures gas temperatures in the multiclone to aid him in his control. He maintains liaison with the operators on the calcine kilns by phone, so that if a speed up or slow down is indicated he can accomplish it without leaving the control floor.

Cooling

The 6 by 96-foot rotary cooler contains lifters for tumbling and cooling the hot nodules. Air drawn through the cooler causes a temperature drop from 2,200° F. to 300° F. at the discharge end. Nodules dropping from the cooler to a metal conveyor pass through a Stephens-Adamson splitter and a Denver sampler. Reject is stockpiled by conveyors.

Dust Collection

Dust laden gases from the calcine kilns are passed through a wet, single-stage cyclone scrubber, and the resulting slurry is recycled to the mill thickener operating on filter cyclone overflow. The circulating load between the kilns and the mill is about 24 tons per day. Gases from the nodulizing kiln are drawn through a multiclone and then through a two-stage cyclonic scrubber by a 70,000 cubic feet per minute fan. Dust dropped from the gas stream in the multiclone, joins that which settles in the dust hoods of the calcine and nodulizing kilns; it is air-pumped by a 7,500 cubic feet per minute positive blower back to the calcine kilns. (Some lead oxide is contained in this dust and possibly could contribute to building up of Pb in nodules.) The



Two-stage scrubber handles dust laden gases produced in the nodulizing kiln.

slurry produced in each stage of the nodulizer scrubbers contains most of the Pb fumed off the kiln and is stored in 160 by 8-foot tanks. Dust produced in the cooler passes through a cyclone at the discharge end; the precipitated material drops through a counter-balanced trap door to the metal conveyor handling cooled nodules. Water sprays further cool the nodules before they are sampled.

The nodulizing kiln is set on a slope of 7 16-inch per foot and the three tires are water cooled. Air for the high pressure burners is furnished by a 15,000 cubic feet per minute fan.

Nodule Specifications

Stockpiled nodules must meet a 45 percent Mn grade and contain less than 1 percent of combined Cu, Pb, and Zn. In addition nodules must contain less than 5 percent minus 20 mesh material. Nodules are picked up and loaded on 25-ton Fruehoff trailers powered by GMC tractors, and taken to a shipping siding at Henderson.

Staff Looks Ahead

The forward-looking staff of Manganese, Inc., F. A. McGonigle, vice president and general manager, is continually studying methods to improve techniques. Surface studies of the ore now being made may point the way to improved milling and nodulizing steps. A well integrated personnel program promises to make this organization an important contributor to our raw material stockpile.

Table No. II

Reagent Consumption and Points of Addition at Manganese, Inc.'s Flotation Mill, Henderson, Nevada

Point of Addition	Reagent	Units Per Ton
FLOTATION		
Rod Mill	Grinding Rods	0.2 pound per ton of feed
After cyclones	SO ₂	8.5 pound per ton of feed
Before Cyclones	Na ₂ CO ₃	3.0 pounds per ton of feed
To Conditioner	Emulsion	250 pounds per ton of feed
Food Pump		
Mill water	Water	2,500,000 gallons per day
NODULIZING		
Kiln Feed	Coke	3.0 to 5.0 percent of dry filter—cake tonnage
Kiln Feed	Na ₂ CO ₃	.5 to 2.0 percent of dry filter—cake tonnage
Burner	Bunker C oil	2 gallons per ton of feed for each calcine kiln
Burner	Bunker C oil	10 gallons per ton of feed for nodulizing kiln



A prospecting party sampling an area on the beach. Sampling is being done by boring a hole with an auger;

holes up to 60 feet deep can be drilled by using an auger and extension rods in the form of threaded pipe lengths.

rutile

Australian Beach Yields Wonder Metal

By Leo A. Lyons

Smelter Superintendent
Electrolytic Refining and Smelting Company
of Australia Pty., Ltd.
Port Kembla, New South Wales, Australia

The recent titanium hearings by the Senate Sub-Committee on Strategic Materials with Senator George W. Malone, chairman, have dramatically proved the need for increasing production of titanium metal. Aircraft company engineers reported that a minimum of 350,000 tons of metal would be needed annually for airplanes alone, if supply were available. Key government officials and a special Office of Defense Mobilization committee are working on ways to increase titanium output. Knowing these facts, MINING WORLD secured this special report on Australian beach sands which are the world's largest source of rutile—the mineral that is the main ore of titanium.—Ed.

Australia's sandy beaches have received world-wide tourist publicity for many years. Now, with quickening interest in titanium metal, they are of special metallur-

gical importance as the major world source of rutile. From the same source, also, comes the greater part of the world's zircon.

Australian rutile concentrate production in 1952 set a record with 38,140 tons* valued at £A1,535,816. In output of rutile Australia has easily led the world for many years and, since 1947, has been the major supplier to the United States. During 1952, United States imports of rutile from Australia amounted to



Leo A. Lyons left, author of this article. A. B. Thomas, manager of National Minerals, Ltd.; one of the larger companies mining rutile.

approximately 18,400 tons, while Great Britain imported about 9,000 tons.

Rutile (titanium dioxide— TiO_2) and what may be regarded as its byproduct, zircon (zirconium silicate— $ZrO_2 \cdot SiO_2$), are the only minerals in which Australian production is regularly at the top of world lists. In 1951 and 1952, rutile output was 75 percent of world total. The record 1951 zircon production of 42,410 tons was nearly 70 percent of the total world figure; but, due to higher internal rail freights and other factors, some zircon was not marketed in 1952 and apparent output fell to 60 percent of world production. Zircon is much more vulnerable economically than rutile due to its lower price although recent reports suggest some improvement.

Rutile concentrate with a minimum of 95 percent TiO_2 has a nominal value of \$120.00 per short ton. Zircon concentrate, 65 percent ZrO_2 , is valued at about \$45.00 per long ton.

Australian production for rutile and zircon for the last 10 years are shown in Table No. I. Producing

* Long tons used throughout this article unless otherwise designated.

Table No. I
Australian Rutile and Zircon
Production in Long Tons
From 1943 to 1952

Year	Rutile	Zircon
1943	6,624	10,334
1944	8,703	14,000
1945	9,744	15,180
1946	8,122	12,403
1947	12,725	21,509
1948	15,007	21,887
1949	13,982	20,970
1950	18,312	21,805
1951	35,189	42,410
1952	38,140	29,961
1953*	28,000	40,000

* Preliminary.

companies, plant locations, and approximate monthly output are shown in Table No. II.

Location, Nature of Deposits

The favorable Australian rutile and zircon production figures stem from the fact that their proportion in the heavy mineral fraction of certain beach sands is unusually high. These sands are restricted to a comparatively small strip near the center of the island continent's eastern coastline, lying on both sides of the Queensland-New South Wales border as shown on accompanying map. Reserves are the world's richest and, almost certainly, contain the greatest tonnages of rutile and zircon. To date, proving of reserves has been confined principally to high-grade sands. The vast extent of low-grade deposits can only be guessed. Listed below are tonnages of heavy minerals known to exist in deposits containing between 285 and 780 pounds per cubic yard. (Contents are expressed as percentage by volume or by weight but pounds per cubic yard



When the tide is favorable equipment like this is used to mine the rich areas. Here a 5-ton truck is being loaded with a Berriman loader which scoops the sand directly into the truck. Note sea level near the loader.

JUNE, 1954

[World Mining Section—41]

AUSTRALIAN HEAVY MINERALS IN BEACH SAND DEPOSITS



is most satisfactory. Two percent by volume is roughly three percent by weight or 80 pounds per cubic yard).

Australian reserves of high grade heavy minerals have been estimated as follows: rutile 754,000 tons; zircon 970,000 tons; ilmenite 662,000 tons; and monazite 12,500 tons.

Most production has come from a 50-mile strip beginning not far south of Brisbane. Interest is widening at both northern and southern end of the mineral-rich area.

In addition to rutile and zircon, the sands contain quartz, ilmenite, small amounts of recoverable monazite (1951 production was 293 tons

contained in 1,664 tons of concentrate) and variable percentages of other minerals such as garnet, magnetite, chromite, leucosene, cassiterite, gold, and platinum; in fact, attempts were made to recover precious metals from certain beaches over 50 years ago but without success. The ilmenite at present has no economic value due to a chrome content ranging up to 7.0 percent of chromic oxide which renders it unsuitable for pigment manufacture. Although it has now been proved possible to reduce chromic oxide to as little as 0.2 percent in part of the ilmenite, it is not yet economic to do so. Practically no ilmenite is disposed of, some operators stockpiling their output and others dumping it beyond redemption.

Table No. III shows typical compositions in heavy mineral fractions at various locations shown on the map. Note the varying proportions with different locations.

Apart from the eastern deposits, beach sand and other materials containing heavy minerals are found in various parts of Australia. The richest area appears to be in the southwest but rutile and zircon contents are generally fairly low, with the percentage of ilmenite much higher than on the east coast. Chrome content of the south-western ilmenite is low. Only the

† One relatively new producer of rutile and zircon has announced that sampling indicates an area containing 5,000,000 cubic yards carrying 2.0 pounds of tin per cubic yard. It is hoped to extend the area.



The dark bands carry up to 90 percent heavy minerals and are mined by hand shoveling into trucks.

eastern deposits are worked at present.

Mode of Occurrence

It is accepted that the sand deposits originated in suitable rocks which became weathered during the passage of time. Sand was carried down to the sea shores where weather and wave action have resulted in partial separation of constituent minerals. There are both shoreline beaches and others at some distance inland, indicating at least partial elevation of the coastline subsequent to the decomposition of the rocks. A typical coastline cross section is shown in accompanying illustration.



Tables are being used in both primary and secondary concentrating capacities. Note the wide band of heavy minerals. Concentrate produced by tabling is then subjected to different stages of magnetic separation.

Table No. II
Australian Producers of Beach Sand Minerals in 1953*

Company	Plant Location	Approximate Monthly Concentrate Tonnage†
QUEENSLAND		
Titanium and Zirconium Industries Pty., Ltd.	North Stradbroke Island	1,000 Tons
Mineral Deposits Syndicate	Southport	1,000
Associated Minerals Pty., Ltd.	Southport	1,000
Rutile Sands Pty., Ltd.	Curumbin	750
NEW SOUTH WALES ‡		
Cudgen Rutile Zirconium New South Wales Rutile Mining Pty., Ltd.	Cudgen	1,000
Titanium Alloy Manufacturing Division of National Lead Company	Cudgen	750
Metal Recoveries Pty., Ltd.	Mooball	1,000
Zircon Rutile Ltd.	Byron Bay	400
Titanium Minerals Ltd.	Weedburn	1,500
National Minerals Ltd.	Newcastle	Unknown (new plant) 300

* Export of unseparated minerals is prohibited by Commonwealth government.

† Output of mixed concentrate which are roughly one-third rutile and one-third zircon.

‡ In 1953 interest extended south of Sydney. Deposits appear to be smaller, but grade is high in some instance. A small tabling plant and electrostatic separation unit near Port Kembla has produced about 100 tons of marketable rutile and zircon.

The heavy minerals are found in ocean beaches, on the raised beaches (now dune covered), in swamps or stream beds inland from the beaches and in high, fixed sand dunes. Ocean beach deposits are usually up to six feet in thickness, a number of seams occurring one below another with separating layers of quartz sand. The mineralized bands vary in thickness from about one-eighth inch to several inches or a foot and carry 70 to 90 percent of heavy minerals. Six feet is about the rise and fall of the tide; band concentrations are considered to be formed by wave action during storms. The same effect generally gives rise to a gradual concentration in a northerly direction along any particular beach due to seas rolling in from the southeast. Ocean beach deposits may be from a few feet to 200 feet wide and are sometimes

regenerated by storms after an area has been worked over.

Raised beaches have similar concentrations of minerals to present ocean beaches but, being dune covered, overburden must be removed for working. Swamp and stream concentrations have been formed by erosive factors and are of intermediate grade. The high, fixed dunes, covered by vegetation, have lowest heavy mineral contents but represent by far the greatest tonnages. They have not yet been worked. On Stradbroke Island alone, scout boring has already proved at least 200,000,000 cubic yards containing about 80 pounds per cubic yard, i.e., 6,000,000 tons of heavy minerals.

Evaluation of Deposits

Sampling may be conducted to a pattern by boring holes, up to 60 feet deep if necessary, with a post-hole auger and extension rods in the form of screwed pipe lengths. Below water level, it is necessary to use a casing with a sludge pump for recovery of the core. When testing underwater locations, a party works from a raft from empty oil drums or similar containers.

Percentage of heavy minerals is determined in one of several different ways. A weighed sample may be panned or separated into fractions of different gravities in suitable organic liquids such as bromoform. In some cases, it is sufficient to sift the sample through an 80 mesh sieve, the heavy mineral being entirely in the minus-80-mesh fraction.

General Methods of Working

Overburden is removed by drag-line scrapers, scoop, or bulldozer and the banded layers loaded into trucks by shovels or mechanical

Table No. III
Percentage Composition of Australian
Beach Sand Heavy Minerals

Location	Rutile	Zircon	Ilmenite	Monazite
SEA BEACHES				
North Stradbroke				
Island	37	31	31	0.2
Southport	37	38	24	0.6
Cudgen	28	51	21	0.5
Crabbe's Creek				
Beach	39	39	22	0.5
Cape Byron	28	53	18	0.6
Swansea	45	33	20	2.0
Port Kembla	36	27	14	0.3
INLAND AND BELOW DUNES				
North Stradbroke				
Island	26-27	26-28	47-44	0.3
Burleigh	20-29	30-42	50-28	0.1-0.9
Cudgen	40-37	36-39	23	0.5

loaders. Aircraft landing strip matting is used for crossing loose sand with trucks which are the principal means of transport. One operator has a narrow gauge rail track on the beach with Diesel locomotive and side dump cars. To date, no high dune deposits are worked. Suction dredging is practiced on certain deposits that are below water level in swampy locations.

Recovery methods are based chiefly on the specific gravity of the minerals coupled with their magnetic and electrostatic properties. These properties are listed in Table No. IV.

The sands are readily dressed by gravity methods, either tables or spirals being used for primary concentration. There appears to be a preference for spirals because of their low capital and maintenance costs. They are also mobile, one operator transferring a battery from place to place as required. The same producer separates zircon by flotation, being unique in this respect.

After primary concentration, mixed heavy minerals (70 to 90 percent in the product) are usually transported some distance to a central separation plant where electromagnetic and electrostatic treatments yield rutile, zircon, ilmenite and, possibly, monazite concentrates.

Depending upon the flow-sheet employed and the amount of equipment available, producers market rutile of 95 to 99 percent grade and zircon varying between 94 and 99.7 percent (usually 99 percent or better). Recoveries, as may be expected, are variable, being largely governed by the tailing cutoff setting in initial concentration.

Examples of Practice

ZIRCON RUTILE LIMITED: This company was formed in Melbourne, Victoria, in 1934. It is the oldest established producer and one of the largest. Operations are conducted in the Bryon Bay area of New South Wales.

Beach seams are stripped by Allis-Chalmers HD7 tractor and loaded into trucks with a LeTourneau overloader. The primary spiral plant uses spirals made from concrete; each has five turns and produces concentrate, middling, and tailing. There is also a mobile spiral plant mounted on a trailer and a third battery of spirals on a suction dredge which the company has working in a pond located among low dunes. The total number of spirals is 110.

Primary concentrates, varying from 50 to 90 percent depending upon initial grade of sand, are re-concentrated in more spirals to a product carrying about 50 percent zircon, 25 to 30 percent rutile and 1 to 1½ percent quartz. This is further treated on straking tables for removal of gold and cassiterite.

Zircon is recovered from the mixed mineral concentrate by flotation, said to give highest zircon recovery in spite of some operating disadvantages. The company pioneered and holds patents for the zircon flotation process which involves a preliminary conditioning in nearly boiling soap solution, followed by water washing, treatment with sulphuric acid, and floating with eucalyptus oil as a frother. Cells are Denver "Sub-A's," mechanically agitated. Concentrate is filtered, dried, and subjected to magnetic treatment in order to remove responsive material. Final zircon is not less than 99.4 percent pure.

Flotation tailing is also filtered and dried, then subjected to several magnetic separations. A non-magnetic fraction is finally treated electrostatically to produce rutile concentrate of 97.5 percent grade.



A bulldozer stripping overburden of lightly mineralized sand to expose rich bands of heavy minerals.

Separation equipment includes a Memco-Hope magnetic separator, an Exolon high intensity induced roll magnetic separator and a Maclean disc separator.

Monthly throughput of sand is of the order of 1,400 tons, annual output being 10,000 to 11,000 tons of zircon and 7,000 tons of rutile.

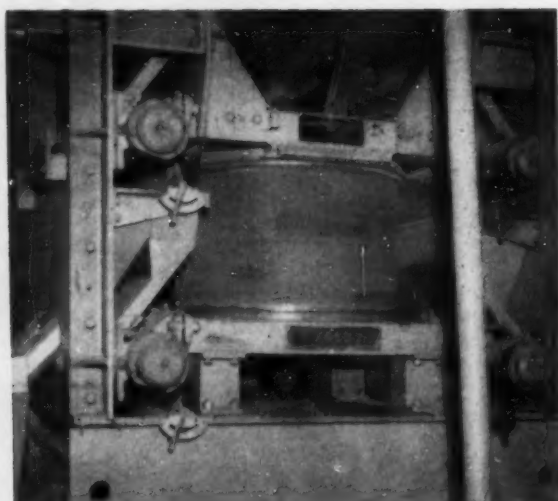
NATIONAL LEAD COMPANY (TITANIUM ALLOY MANUFACTURING DIVISION): This United States-owned producer removes overburden from its leases with power scoops and loads heavy mineral by scraper into narrow gauge rail trucks. Preliminary concentration is on Wilfley tables, with the cut adjusted to reject most minerals of intermediate specific gravity. Tailing thus carries some rutile but reconcentration occurs on the beach and will permit later retreatment.



A bank of Humphrey spirals used for primary concentration of the heavy minerals producing about an 80 percent rutile-zircon-ilmenite concentrate. This product is then up-graded by tabling and electrostatic treatment.



Concentrate produced by tabling or flotation is dried and then treated by electrostatic, low intensity (left),



and high intensity (right), magnetic separators to remove the zircon and produce a market grade rutile.

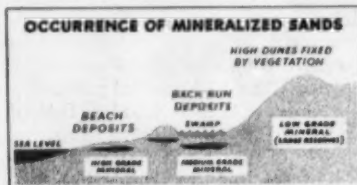
Concentrate is dried in a rotary dryer, then given electrostatic treatment to remove zircon which is cleaned by high intensity magnetic separators to a 99 percent product. Residue from the electrostatic separation is passed through high intensity magnetic separators to remove ilmenite and leave a 97 percent rutile product.

TITANIUM AND ZIRCONIUM INDUSTRIES PTY. LTD.: This project is also a subsidiary of an organization with interests in lead—the Consolidated Zinc Corporation Ltd. whose principal ventures are the Zinc Corporation mine at Broken Hill and affiliated interests.

At present, most of the company's raw material is derived from a suction dredge working a swamp deposit on North Stradbroke Island, off the Queensland coast. Dredging can be to a depth of 35 feet below water level. Mineralized sand is pumped ashore through an 11-inch-diameter pipeline. Primary concentration is in a battery of 50 Humphreys spirals (roughers), followed by 12 cleaners. 80 percent concentrate is carted some miles to the separation plant where final cleaning is on one Wilfley and two Deister tables.

Dried concentrate is next subjected to electrostatic treatment which separates "ilmenite-rutile"

and "zircon-rutile ilmenite plus other minerals." The first of these fractions is separated into its components by low intensity magnetic separation; rutile is added to the second fraction while ilmenite is transferred to a stockpile. The rutile-containing material is then treated in a rougher electrostatic machine followed by high intensity magnetic separation and, finally,



cleaner electrostatic treatment to produce market rutile.

The company is considering methods of working the leaner high dune deposits on a large scale. Typical concentrate analyses are shown in Table No. V.

Literature

As would be expected, considerable literature on rutile-zircon recovery exists in Australian publications. It has been drawn upon in compiling this article and a list of references is appended. In addition to material dealing with the processing of mineral deposits and cleaning of the minerals, there is much available regarding the technology of titanium metal. Early Australian research into the production of metallic titanium and its alloys aroused keen interest overseas, and, although on a small scale due to limited resources, it has been of great value. A recent announce-

ment by the Minister for Supply stated that Great Britain had requested the Commonwealth to undertake further work and this will be principally based on Melbourne.

1. *The Australian Mineral Industry*, Quarterly Review, Vol. 5, No. 3. Melbourne: 1953 (Bureau of Mineral Resources).

2. *Mineral Resources of Australia*, Summary Report No. 1, Zirconium. Canberra: 1951 (Bureau of Mineral Resources).

3. *Mineral Resources of Australia*, Summary Report No. 2, Titanium. Canberra: 1951 (Bureau of Mineral Resources).

4. *The Australian Mineral Industry 1951 Review*. Melbourne: 1952 (Bureau of Mineral Resources).

5. K. S. Blaskett: Concentration Practice in the Australian Beach Sand Industry; *Proceedings of the Australasian Institute of Mining and Metallurgy*, Nos. 158-159, 1950, P. 105.

6. M. G. Bayly: Beach Sand Mining in Queensland. Paper No. 29 presented at the First Ordinary Meeting of the Australasian Institute of Mining and Metallurgy, August 1952.

7. H. H. Dunkin: Concentration of Zircon, Rutile Beach Sands Vol. III (preprint) P. 230, of the Fifth Empire Mining and Metallurgical Congress, Australia, 1953.

Table No. IV
Physical Properties of Heavy Minerals

Mineral	Specific Gravity	Magnetic Attractive Force (Iron equals 100)
Magnetite	5.18	40.18
Zircon	4.7	1.01
Ilmenite	4.55	24.70
Rutile	4.3	0.37
Quartz	2.65	0.37

Table No. V
Typical Percentage Analyses of Titanium and Zirconium Industries Pty. Ltd's Concentrates

Mineral	Rutile	Zircon
TiO ₂	97.4	0.09
ZrO ₂	0.17	67.0
FeO	0.18	0.04
Free SiO ₂	0.015	0.02
Total SiO ₂	—	32.8



SURFACE INSTALLATIONS were limited to the ventilation fan at the portal and the dump. Equipment and

supplies were stored in the open as the work was accomplished during the summer months.

What Equipment, Time, and Money It Takes To Drive 1,538 Feet of Exploration Adit

by A. W. Griffith

What equipment is necessary? How long will it take? How much will it cost? These are questions that have been asked many times about driving an exploration heading. And of course, there are no definite answers to these questions.

There are many conditions, such as the size of the opening, type of ground, location of the property, manpower available, etc. that must be considered before making an estimate. The only way to determine the answers to these questions is to do the job, list the equipment used, and calculate the time and cost.

This is the story of the equipment, time, and money required by one Northwest mining company to drive 1,538 feet of 5- by 7-foot exploration adit. This story might help you estimate your next drifting operation. Or, it will be interesting to compare these results with some of your own.

Approximately one mile of access road had to be built up a steep mountainside and the area cleared before the adit could be started. All work was done during the summer months and storage or other types of buildings were not required.

Equipment Used for Adit

All muck was loaded by an Eimco 12B RockerShovel into an Ajax side

dump car with sideboards. Only one car was used for the job and with the sideboards it had a capacity of 40 cubic feet. An air locomotive (Eimco Model 401) was used for tramming.

The 23-hole rounds were drilled by two Copco-Pacific drills with pneumatic pushers. The drill steel was $\frac{7}{8}$ -inch hexagonal, 7-foot 10-inches long, with an integral tungsten-carbide bit. Compressed air was

Could Your Operation Match This Northwest Mining Company's Record in Driving a 1,538 Foot Adit?

EQUIPMENT:	TIME:	MONEY:
1—Mucking machine	Total time was 4½ months	Labor \$ 9.36 per ft.
1—Air locomotive	Total number of man-shifts at the face was 382.	Supplies 10.21
1—40 cubic foot car	The average per man-shift, at the face, was 4.02 feet.	Overhead 4.10
1—315 cubic-foot-per-minute compressor		Equipment 2.28
2—Drills		Total \$25.95 per ft.

TABLE NO. 1
Air Locomotive Pressure-Distance Tests

Test No.	Pressure Gauge Readings in Pounds At Start	Readings in Pounds Stopped	Number of Cars	Distance Trammed
1	130	40	0	2,150 feet
2	125	44	0	2,000
3	90	36	0	1,200
4	128	48	1	1,500
5	130	44	1	1,750

supplied for the air locomotive and the drills by a 315-cubic-foot-per-minute Gardner-Denver compressor.

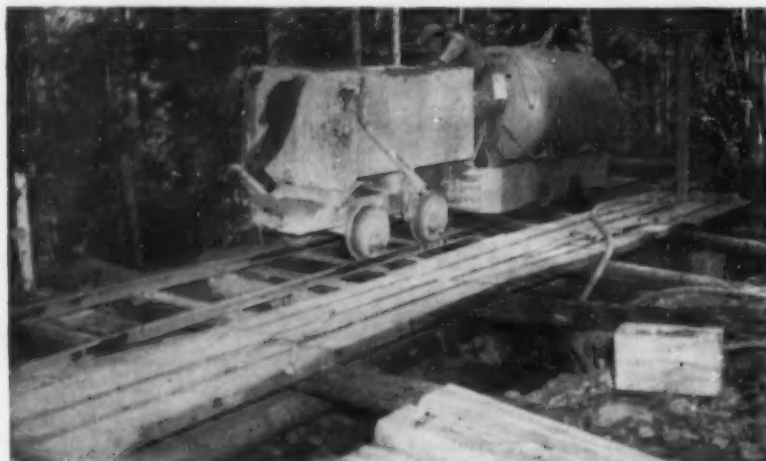
Twenty-foot sections of 25-pound rail were used for the track. The ties were 5 by 8 by 40 inches, and the track spikes were $\frac{1}{2}$ by 4 inches.

Two-inch air pipe and one-inch water pipe were suspended from the back along the top left side of the adit. All hose was Eimco wire braid type; 1-inch for air and $\frac{1}{2}$ -inch for water.

Ventilation was supplied by a 5,000 cubic-foot-per-minute fan installed at the portal. Twelve-inch fan pipe, suspended below the air and water pipe, delivered fresh air to the face. In addition to the equipment listed above, there were all the small tools such as axes, picks, shovels, etc. necessary for any operation.

Motor Tested For Distance

Several test-runs were made with the air locomotive to deter-



AIR LOCOMOTIVE AND CAR are shown at the end of the dump. The motor had a tramping distance of 1,200 feet.



MUCKING TIME for the average round of 20 cars was 2 hours. Only one car was used.



FACE IS READY TO DRILL. Drilling and blasting the 5 by 7 adit averaged 2 hours and 25 minutes.

mine the total possible tramping distance with various starting pressures. The results of these tests are listed in Table No. 1.

All tests were run on a 500-foot stretch of straight track under ideal conditions. It is estimated that under normal conditions, with 100 pounds of air pressure and one 40-cubic-foot car, the tramping distance would be 1,200 feet without stopping to charge the receiver.

Job Finished in 4 $\frac{1}{2}$ Months

The adit was driven a total distance of 1,538.4 feet in four and a half months. Two shifts of two men each per day worked at the face. There was one company supervisor on the job.

The miners were paid a contract rate of \$7.00 per foot of drift advance. Time and a half was paid for the sixth day, which made the overall footage rate \$7.93 per foot.

A total of 382 man-shifts at the face were required to complete the drift. This made an average advance of 4.02 feet per man-shift. The advance for each period of the four and a half months is shown in Table No. 2.

Three separate time studies of the drifting cycles were taken during various stages of the job. Table

MINING WORLD



MUCKING OUT THE ROUND in the exploration adit. Driven in quartzite the adit required very little timber.

No. 3 lists the results of these studies. The mucking time includes installing track, pipe, etc. Drilling and blasting time includes clearing smoke.

Total Job Costs Listed

An itemized list of the job costs is shown in Table No. 4. The cost per foot for each of the items was calculated for a total footage of 1,538.4 feet. The road and bridges item (under Supervision and Overhead) is for the access road.

The drift was driven in quartzite and very little timber was required. Had timbering been necessary, the speed, as well as the cost of the operation, would have been adversely affected.

Job Was Well-Organized

This was a very well-organized and equipped operation. The cost per foot of the drift clearly demonstrates that every dollar spent was utilized to the maximum. The average advance of 4.02 feet per man-shift was possible because of the good equipment, the experienced miners, and the contract rate paid to the miners. The engineers in charge of this operation should be very proud of the results achieved.

JUNE, 1954

TABLE NO. II
Adit Advance and Man-Shifts Per Period

Month	Accumulative Advance (feet)	Period Advance (feet)	Man-shifts at face	Advance in feet* per man-shift
May				
1st period	247	247	52	4.75
2nd period	519	272	56	4.86
June				
1st period	696	177	44	4.02
2nd period	811	115	31	3.71
July				
1st period	979	168	44	3.82
2nd period	1,183	204	54	3.78
August				
1st period	1,377	194	50	3.88
2nd period	1,523	146	47	3.11
September				
1st period	1,538.4	15.4	4	3.85
Totals		1,538.4	382	

*Average advance per man-shift 4.02.

TABLE NO. III
Adit Cycle Analysis

Cycle No.	Distance Trammed	No. Cars Trammed	Mucking Time	Drilling and Blasting Time	Total Time
1	450 Feet	21	2 hrs.,-11 min.	3 hrs.,-5 min.	5 hrs.,-16 min.
2	600 Feet	20	1 hr.,-40 min.	2 hrs.,-10 min.	3 hrs.,-50 min.
3	1,000 Feet	18	2 hrs.,-13 min.	2 hrs.	4 hrs.,-13 min.
Average Time Per Cycle 4 hours, 26.3 minutes.					

TABLE NO. IV
Total Cost Breakdown For Driving
1,538 Feet Of Exploration Adit

Item	Total Cost	Cost per Foot
Labor		
At face	\$12,192.94	\$ 7.93
Non-face (Mechanical, preparatory)	2,190.84	1.426
Sub-total	\$14,383.78	\$ 9.356
Materials and Supplies		
Rail, fittings and ties	\$ 2,147.62	\$ 1.397
Pipe and fittings for air and water lines	1,830.46	1.191
Stulls, lagging and lumber	233.75	0.151
Powder fuse and caps	4,371.71	2.840
Drill steel, drill parts, hose, etc.	1,727.48	1.123
Compressor supplies	1,429.71	0.930
Mechanical shovel supplies	289.38	0.188
Ventilation pipe and supplies	1,425.89	0.928
Tools and other supplies and expenses	336.14	0.218
Rent of compressor	1,538.40	1.000
Rental on dry room and electric cap-lamps	76.40	0.049
Electric Power	10.92	0.008
Maintenance of haulage equipment	250.24	0.163
Maintenance of pumping equipment	37.76	0.024
Sub-total	\$15,705.86	\$10.210
Supervision and Overhead Expense		
Supervision	\$ 2,147.42	\$ 1.400
Social security taxes	353.54	0.230
Industrial insurance	611.64	0.398
Hospital and Physical examinations	69.53	0.045
Overhead on labor	440.08	0.287
Handling charge on supplies	364.67	0.237
Truck and auto expense	79.35	0.053
Road and Bridges	2,226.00	1.450
Sub-total	\$ 6,292.23	\$ 4.100
Equipment		
Two Atlas rock drills	New Price 680.00	Charge off 680.00
Two pneumatic pushers	330.00	330.00
One used mine car		100.00
One Einco Model 12B Rocker Shovel	2,957.00	1,000.00
Ventilation Fan and Motor	175.00	175.00
One Einco air locomotive	2,350.00	800.00
One bit grinding machine	185.00	185.00
One 4 by 6 Fairbanks-Morse duplex pump	147.93	147.93
One cedar Tank	100.00	100.00
Sub-total	\$ 3,517.93	\$ 2.285
GRAND TOTAL	\$39,899.80	\$25.951



Uranium Ore Producers officers are Kim Theobold, secretary-treasurer (seated); Norman Ebbley, first vice president; Tom Skidmore, president; and John Schu-



macher second vice president. The picture at right shows the crowd listening to Blair Burwell say that the uranium area is a land of opportunity.

Rotary Drilling and Mechanized Mining Are Features of Uranium Ore Meeting

Uranium—how to find it and how to mine it—was the reason for the first meeting and machinery exposition of the Independent Uranium Ore Producers Association held at Grand Junction, Colorado on May 7, 8, and 9.

More than 1,000 people attended the \$1,000,000 machinery exposition to get the answers. Drilling is the way to find uranium and the trend on the Colorado Plateau is to carry on exploration at ever-greater depth, utilizing more and more rotary drills with tri-cone roller bits, drilling either dry or with water. The larger drilling rigs have both a compressor and a sludge pump, so

that either method may be used. Mechanization is the key to mining. The trend here is to Diesel-powered, rubber-tired units for both loading and haulage. Front end loaders are predominant.

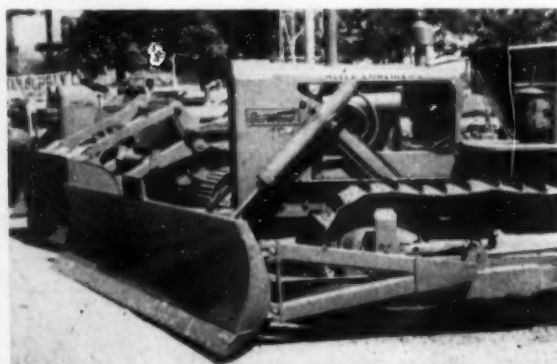
The big question, of course, is where to find uranium. Anyone wanting to get into the uranium business had a wonderful opportunity at the exposition. Claim owners, lease brokers, stock salesmen, and royalty holders all claimed that they had a second Mi Vida for sale. More and more geological field work and laboratory research is being directed to the occurrence and formation of uranium deposits. Ervin

Waulters, geologist for the Vanadium Corporation of America, Durango, Colorado, said that the largest uranium mines were localized along the flanks of anticlines. The preferential zone for uranium deposition was midway between flood plain and ancient river channels, areas of equal sands and muds.

Blair Burwell, president of Minerals Engineering Company, Grand Junction, Colorado, and master of ceremonies at the technical sessions, told the group that the area was the "land of opportunity" and that uranium opportunities exist for those who will take chances and fight through to success. Evidence of this



Exploration and mining equipment valued at \$1,000,000 was on display at the machinery exposition. The S. & M. Co. exhibit, at left, featured Le Roi and



Gardner-Denver compressors. At right: Allis-Chalmers rubber-tired Tracto Loader and the track-mounted Tracto Shovel and Gar Wood blade on a tractor.

was outlined by several speakers who described ever-expanding uranium mining activities.

The growing importance of uranium in Arizona was discussed by Garth Thornberg of the Thornberg Mining Company, Phoenix. He reported on "the new uranium districts, with a number of fine discoveries, in the Globe area. Many prospectors are in the field and there has been wide-spread claim staking, both by Arizona residents and experienced uranium miners from Colorado." Mr. Thornberg estimated that it would take at least a year to evaluate the discoveries and added that major companies such as the "Kerr McGee Oil Company were prospecting for uranium out of Nogales, and the Sheridan Wyoming Coal Co. had purchased claims and were mining pitchblende from the Dripping Springs Quartzite out of Globe."

Mr. Thornberg also called attention to New Mexico and said that it was another state to watch for uranium. He added, "There has been a higher ore ratio to initial discovery in New Mexico than on the Colorado Plateau."

Irving Rapaport, geologist for the Four Corners Exploration Co., of Grants, New Mexico said that 100,000 feet of exploration hole was drilled monthly in the Grants Area, that ten rotary drills were currently in operation, and that important ore discoveries were being made.

Blair Burwell reported that the uranium age had only begun and that uranium mining would be of greatest importance in the future. He said that there were possibilities that uranium fuel would do away with the conventional heat cy-

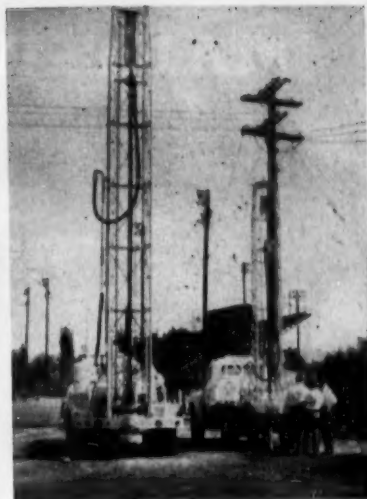


Virgil Bilyou, superintendent, Utex Exploration Company, Moab, Utah; George Setter, Western Machinery Company, Denver; and Robert Pruess, Climax Uranium Company, Grand Junction, discuss mechanized mining methods.

JUNE, 1954



Prospecting for uranium means drilling—deeper drilling everyday with the trend to rotary rigs. The Winter Weiss Portadrill is shown at left and two George E. Failing rotaries at right.



A Mayhew truck-mounted rotary drill is shown at left, it is the Model 1,000. Ore trucking is a big business on the Plateau with long hauls commonplace. A huge cable-dump Mack truck is shown at right.



cle, that the energy from uranium may some day be converted to direct work without the present necessity of generation from steam . . . in other words, electric power directly from uranium without any middle steps. He said that this might revolutionize the entire technological world.

The implications of this are so startling that the peace-time applications of uranium energy could mean that mining on the Colorado Plateau could be the most important in the world, that today's mining and prospecting rush ranks with that of the Klondike, Goldfield, and the Comstock has only begun.

On the business side of the program, Tom Skidmore of Dove Creek, Colorado was elected president of the association by the board of directors. Six directors were added to the association this year to give representation to new uranium districts now coming into production. Last year the association had 15 directors—this year it will have 21. The districts now represented are: Grand Junction area, Moab area, Dove Creek - Cortez area, Naturita - Norwood area, Gateway area, Blanding-Monticello area, Indian Reservation area, Greenriver-Hite-Utah area, Grants area, Arizona area, South Dakota-Wyoming area.

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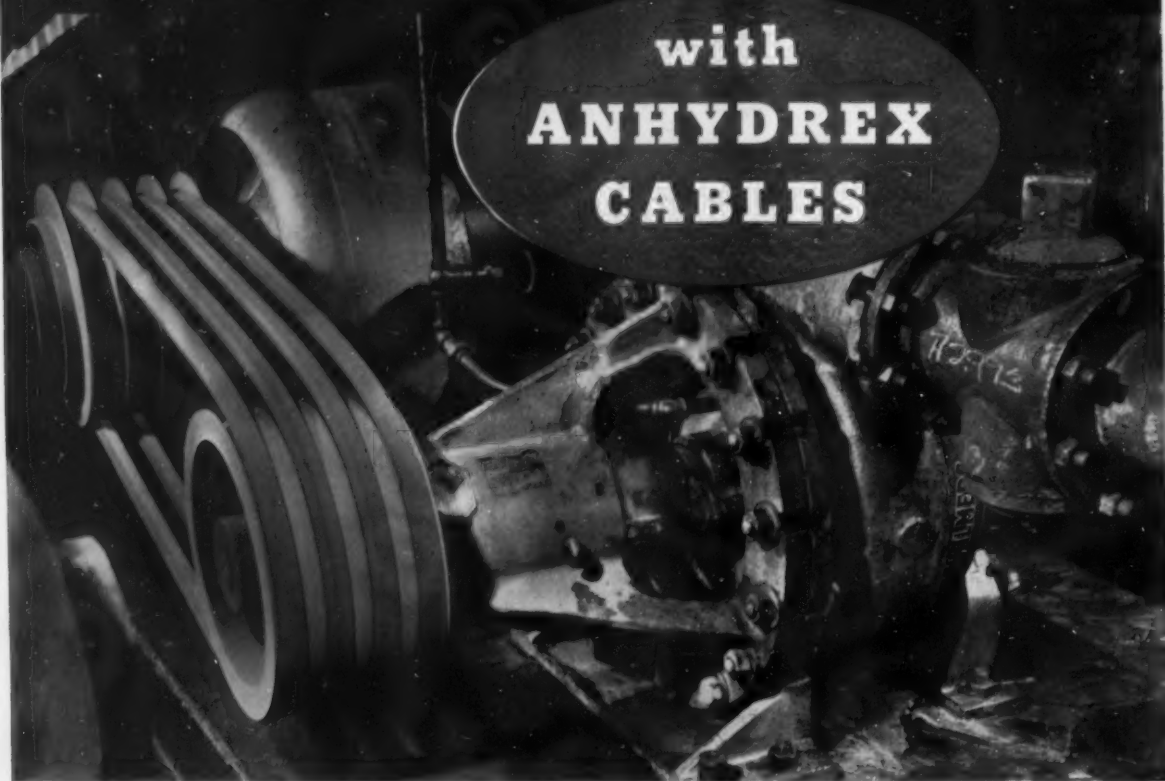


Photo courtesy ALLIS CHALMERS MFG. CO.

Getting rid of unwanted mine water is not something that can be put off until tomorrow. Frequently it must be done today — or else.

Continuous operations, such as pumping, should not be left to haphazard selection of "just any kind of cable." For service as important as this, only the highest grade cable should be installed. Penny-pinching is definitely not economy. All it does is increase your cost of operation.

Ask yourself how much it would cost if a cable failed and put a pump out of operation. When

you think that way it should be obvious that ANHYDREX is the cable you should buy and install.

The conductors of Simplex-ANHYDREX Cables are insulated with a low water-absorptive rubber insulation. They are protected by a generous wall of a special neoprene jacket. That is a combination that can't be beat.

The next time you need a cable for pumping service, regardless of the difficulties involved, install a Simplex-ANHYDREX Cable. It will pay you large dividends in peace of mind and in long-time operation.

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ACTIVITIES OF U. S. MINING MEN



New uranium deposits in New Mexico were described by **TOM EVANS**, chief mining engineer for the Santa Fe Railroad, at a recent meeting of the American Society of Mining and Metallurgical Engineers in Los Angeles. The newest of the three Santa Fe claims is 40 miles east of Gallup in an area known as Poison Canyon. Mr. Evans said that the deposit was originally discovered by a Navajo shepherd, Paddy Martinez, who complained to the mining engineer that his sheep were dying of a mysterious poison. Mr. Evans, who was in New Mexico to check uranium reports, investigated and learned that the poison was rattleweed, a selenium-bearing growth which is said to occur mainly in uranium area. This discovery led to the discovery of the Poison Canyon Mines. The Navajo shepherd has been put on a pension by the railroad for his find.

Fred Searles, chairman of the board of the Newmont Mining Corporation, has been visiting in Goldfield, Nevada, site of the former Goldfield Deep Mines company, which Newmont helped finance between 1947 and 1949 until the ore body proved unsatisfactory. An auction of the remaining holdings of Goldfield Deep Mines May 11 was expected to satisfy a deficiency judgement of \$320,349.26 in favor of Newmont.

John C. Frye, director of the State Geological Survey at the University of Kansas, has been named chief of the State Geological Survey for Illinois. He takes over his post as head of the largest state geological agency in the nation July 1.

Elmer F. Harris has been appointed manager of metallurgy, inspection and research at the Tennessee Coal and Iron Division of United States Steel Corporation. His former position was assistant manager of manufacturing operations for the division.

Recent promotions at the Carlsbad, New Mexico plant of the International Minerals & Chemical Corporation's Potash Division are: **Merton I. Signer**, advanced from geologist to mine engineer; **Howard J. Husing**, named mine surveyor; and **Robert H. Lane**, who was promoted to geologist.

Stanley McDougall, mine superintendent for Bunker Hill & Sullivan Mining & Concentrating Company in Kellogg, Idaho since 1934, has been promoted to the new position of manager of mines.

H. V. Kruse, chief engineer of the mechanical department at Phelps Dodge Corporation's Douglas, Arizona plant, has retired after 29 years with the firm.

Marshall L. Havey, assistant to the president of the New Jersey Zinc Company, was reelected president of the American Zinc Institute at the group's annual directors meeting. Also reelected were three vice presidents: **H. Leverett**, National Zinc Company, Inc., New York; **G. W. Potter**, Potter-Sims Mines, Inc., Joplin, Missouri; and **Frank A. Wardlaw, Jr.**, International Smelting & Refining Company, Salt Lake City, Utah.

Edwin J. Eisenach has been promoted to the new post of assistant general superintendent for Climax Molybdenum Company at Climax, Colorado. Replacing him as assistant mine superintendent is **William Distler**. Mr. Eisenach has been with Climax for 11 years.

R. T. Bell has assumed his position as assistant to the general superintendent of Pickands Mather & Company in Hibbing, Minnesota. He had been working as superintendent of the Bennett iron mine.

Lee C. Travis, metallurgist for the American Smelting and Refining Company, has been transferred to the Denver, Colorado office to take up the position of ore buyer. He replaces **James Cox**, who is now at the New York City office of the company.

L. M. Scofield has resigned as geologist with Pickands Mather & Company. He plans to open a consulting business in Duluth, Minnesota.

George H. Musson is working at the Colorado School of Mines Research Foundation in Golden, Colorado. He formerly was chief metallurgist for General Chemical Company's mining division with headquarters at Boulder, Colorado.

Alvin Guscatt, superintendent of the Blueberry iron mine, North Range Mining Company, has been transferred to the Leonidas iron mine in Eveleth, Minnesota. He will supervise operations to re-open the mine there.

Walter D. Abel, mining and petroleum engineer with the state of California Division of Corporations, has resigned his position to devote full time to his new consulting practice. Offices for his company will be in Los Angeles, California.

Warren G. Kleban will head the new Starkville, Mississippi office of S. Schwartz & Associates, consulting engineering firm which specializes in technical and cost reduction work in the sulfur-chemical industries. Mr. Kleban has been active in the engineering and construction business in the mid-southern states for several years.

Joseph T. Terry, consulting metallurgist of Rosemead, California, has completed an assignment at the Arizona Eastern Fluorspar Corporation mill in Duncan, Arizona.

M. T. Smith, mining engineer for International Minerals and Chemical Corporation, has been promoted to mining superintendent of the Florida Phosphate department. He succeeds **I. S. Tillotson**, who has been named property superintendent for the department. Both men are stationed at Bartow, Florida.

Neilsen B. O'Rear, U.S. Bureau of Mines information officer, is the new public information officer for the Grand Junction Operations Office of the U.S. Atomic Energy Commission. Mr. O'Rear has been assistant chief of the Office of Minerals Reports, Bureau of Mines, since 1941.

Marvin L. Kay, vice president and general manager of the Climax Uranium Company, Grand Junction, Colorado, has been named president of the Colorado Mining Association, succeeding the late **Harold Worcester**, who died of a heart attack two days after his election last winter.

Richard Pehrson, assistant manager of the American Smelting and Refining Company sampling plant in Monticello, Utah, has been named manager of the new U.S. Atomic Energy Commission sampling plant at Moab. American Smelting will operate the facility as ore buying agent for the AEC.

Recent executive changes for the Climax Molybdenum Company made by the board of directors in New York include the appointment of **WESTON G. THOMAS** to the position of executive vice president. Mr. Thomas joined the company in 1949, having served with the Potash Company of America in Denver, Colorado before that time. Other board appointments included **FRANK COOLBAUGH**, general manager in charge of western operations, who was elected vice president, and **ALVIN J. HERZIG**, president of the subsidiary Climax Molybdenum Corporation of Michigan, who was named vice president, research.



The Grand Junction Operations Office of the U.S. Atomic Energy Commission has announced the appointments of **Edwin H. Crabtree, Jr.** to the post of deputy manager for the office and **Charles E. Tonry** to the directorship of the office's Processing Division. Mr. Crabtree, who has been director of milling for the Eagle-Picher Company's mining and smelting division at Miami, Oklahoma for the last seven years, will help direct and coordinate AEC activities related to the finding, mining, and processing of uranium ores and the purchase of uranium concentrates on the Colorado Plateau. Mr. Tonry's duties will include carrying out the ore processing and concentrate procurement program for the AEC on the Plateau. Formerly, Mr. Tonry was stationed with the U.S. Bureau of Mines at Rifle, Colorado.

R. E. McNeill, Jr., president of The Hanover Bank, was elected a director of American Smelting and Refining Company during a recent board meeting in New York.

Jacob Bleichelsen is the new president of the Rosiclare Lead and Fluorspar Mining Company in Elizabethtown, Illinois.

Nine mining crews from the St. Joseph Lead Company maintained safety records of no lost time accidents during 1953. Foremen of the group, representing 314 employees, are Neil Cooper, Baker Mine; Bill Meyer, Bonne Terre No. 1; Roscoe Fowler, Terre Mine Shop crew; Jack Weber, Doe Run Mine; Everett Gross, Federal No. 5 Mine; Fred Fisher,

Federal No. 6 Mine; Bill Byington, Leadwood North Mine; Alfred Thomure and Homer Cooper, Mine La Motte Mine; Arthur Freeman, Leadwood Machine Shop; Charles Thornton, Leadwood Yard Crew and Glen Maurer, Leadwood Electric Shop.

Alwin C. Eide, manager and vice-president of the American Zinc Sales Company and the American Zinc Oxide Company, has been elected to the board of directors of the parent company, American Zinc, Lead and Smelting Company. He has been with the firm since 1916, serving as a research chemist, metallurgist, sales manager, and sales engineer. Mr. Eide was elected vice president of the parent group in 1950.

Mason Rankin, consulting geologist, has been appointed mining geologist for the Union Pacific Railroad Company in Salt Lake City, Utah. Mr. Rankin served in a similar capacity in 1945 with the American Smelting and Refining Company in East Helena.

OBITUARIES

Albert A. Hoffman, 73, internationally known mining engineer, died May 4 in Oakland, California after a long illness. Vice president of the Calaveras Cement Company in San Francisco at the time of his death, Mr. Hoffman was general manager of the Nicaro Nickel Company, Cuban subsidiary of the Freeport Sulphur Company, in 1942 and 1943. From 1936 to 1941 he had been California manager of the American Potash and Chemical Corporation and previous to that time held several managerial positions with copper mining enterprises in Chile.

Charles P. Robbins, 85, pioneer mining engineer of northern Idaho's Coeur d'Alene mining district and eastern Washington's Republic gold camp, died April 1 in Spokane, Washington. Before the turn of the century, Mr. Robbins was associated with the Gold Hunter Mining Company in Idaho and the War Eagle Mining Company in British Columbia. He was also a secretary of the Northwest Mining Association.

Charles Richmond, 75, mining engineer, died March 31 in Phoenix, Arizona. Mr. Richmond had extensive mining experience in Latin America, serving as mine manager for Butter's Mining Company for several years in Central America and heading an exploration and development unit to Brazilian mica mines during World War II. At the time of his death, he had been examining manganese properties in western Arizona.

Karl M. Leute, president of Lithium Corporation of America, Inc. and Manganese Chemicals Corporation, both of Minneapolis, Minnesota, died March 24 in Phoenix, Arizona. Mr. Leute, who erected the first successful commercial plant for the production of electrolytic manganese, was active in the field of low-grade manganese ores. In 1950 he formed the Manganese Chemicals Corporation to produce compounds from these ores. Early in March he had formulated plans to erect a \$7,000,000 plant for expanded production of the Lithium Corporation at Bessemer City, North Carolina.

Donald C. Gregg, 54, internationally known mining engineer and geologist, died March 7 in Denver, Colorado. On the faculty of the Colorado School of Mines for the past seven years, Mr. Gregg had been actively engaged in mining in Bolivia, Mexico, and the Philippine Islands before World War II. After four years in a Japanese prison camp, he had returned to America and assumed his academic position, in addition to serving as consulting mine geologist for the Mexican government and the American Metal Company.

Zeb Kendall, 78, for 35 years president of the Consolidated Virginia Mining Company at Virginia City, Nevada, died late in February. Mr. Kendall was a leading figure during the Tonopah, Nevada mining boom in the early part of the century.



THE "WHAT" Nearly forty steel mills, here and abroad, have purchased Differential Air Dump cars in capacities ranging from 30 to 60 cubic yards (level load).

THE "HOW" Massive air cylinders on both sides power the two-way, 50" dumping action. Wide spacing of fulcrums contributes to riding stability. No locking mechanism — no accidental dumping.

Down-folding doors chute the load a greater distance from track. Positive door return when car is righted. Overall ruggedness and simplicity of design mean minimum maintenance.

THE "WHY" It all adds up to a "higher ratio of payload to dead weight," superior performance — and ultimately to a prettier picture on the operating statement. That's "why" more and more steel mills have put Differential cars on their "earn-roll."

Other Differential Products: Locomotives, Mine Cars, Mine Supply Cars, Rock Lories, Mantrip Cars, Rotary Dumpers and other dumping devices, and Complete Haulage Systems.



SINCE 1915—PIONEERS IN HAULAGE EQUIPMENT

ACTIVITIES OF INTERNATIONAL MINING MEN

American Smelting and Refining Company officials, Roger W. Straus, chairman of the board, R. F. Goodwin, vice president in charge of mining, and D. J. Pope, assistant to the vice president, have been visiting Mount Isa Mines, Ltd., ASARCO subsidiary in Australia. Other areas, including Port Kembla in New South Wales, are included in the group's itinerary.

Frank E. Noe, formerly with the United States Embassy in Mexico, has succeeded Andrew V. Corry as Minerals Attache in the American Embassy in India.

Emile Trystram, manager of the Societe des Mines de Aellidha in Morocco, North Africa, has returned to France and is now living in Paris.

R. E. Zimmerman, vice president of the Paul Weir Company, Chicago, Illinois, has been transferred to the company's offices in Zonguldak, Turkey.

Cornelis Bloot, recently with the Zeeweg Company in Katwyk, Holland, has assumed the position of economic geologist with the Bureau of Mines and Geology in Monrovia, Liberia.

W. D. McMillan, who had been conducting a test drilling nickel exploration program in Cuba for the Cuban Nickel Company, has returned to the United States and is stationed with the U. S. Bureau of Mines in Denver, Colorado.

K. B. Gross is the new manager of Mount Isa Mines, Ltd., Queensland, Australia, succeeding C. R. Hilton, who is now in the United States. Two officials of Mount Isa, N. Nelson and B. Borgelt, are now at the El Paso, Texas plant of American Smelting & Refining Company. They expect to study operations there for a few months before returning to Australia.

Bernard M. Aderca, Belgian mining engineer, has returned to Brussels from Africa. Until recently Mr. Aderca was the director of the Sermikat mines at Mitwaba in the Katanga province of the Belgian Congo.

Al Osborn, mining engineer from Kellogg, Idaho, is supervising the driving of a 2,600-foot hydroelectric power tunnel on Annette Island near Ketchikan, Alaska.

D. P. Loemban Tobing, formerly employed in the Netherlands, has assumed a position with the N. V. Algemeene Industrieele Mijnbouw en Exploitatie Maatschappij in Indonesia. The firm currently is engaged in manganese production.

G. W. Hills, chief engineer for the Electrolytic Refining and Smelting Company of Australia, Pty. Ltd., has been in the United States studying vertical casting equipment.

J. A. Retty, Canadian geologist and mining engineer, has opened consulting offices in Montreal. Formerly, Mr. Retty was chief geologist with the Iron Ore Company of Canada and president of Fenimore Iron Mines.

H. W. Worner, faculty member at the University of Melbourne in Australia, is carrying out investigations on titanium metallurgy for the Australian government's department of mines and technical surveys.

K. R. Fleischman, former inspector of mines at Herbert, Queensland, Australia, has been transferred to a similar post in the Fiji Islands.

G. P. Contractor, who recently took up residence in Canada, has accepted an appointment with the British Columbia Research Council in Vancouver, B. C.

Angus Livingstone, welder for the Consolidated Mining and Smelting Company of Canada, Ltd., received a \$1,000 award recently for devising a more effective method of removing broken drill rods from steel bits. Mr. Livingstone, whose "suggestion-box" award was the biggest ever given at Cominco, is employed at the Sullivan Mine in Kimberly, British Columbia.

R. H. B. Jones, consulting geologist for Oliver Iron Mining Division in Duluth, Minnesota, is now a staff geologist for United States Steel Corporation's Columbia-Geneva Steel division. Mr. Jones has conducted strategic mineral investigations in both North and South America and is the author of several published reports on geological surveys. He has been with U. S. Steel since 1930.

Thayer Lindsley, president of Eureka Corporation, Ltd., visited the company's operations in Ruby Hill, Nevada, recently. It was his first visit to the property since Eureka acquired it in 1938. Mr. Lindsley was accompanied by Robert Brown, president of Federated Petroleum, Ltd. of Canada.

J. M. B. Gibbons, British mica expert, is serving as an advisor to the Australian government in the development, preparation and marketing of its mica fields, and in this connection has been touring the Australian mica deposits, located in the Central Australian deserts. Under the present Australian system, the entire output of marketable mica is purchased by the government, which then sells it to manufacturers.

Harlan A. Walker, vice president and general manager of Marcona Mining Company in Lima, Peru, has returned from a business trip which took him to San Francisco, California, where Utah Construction Company maintains headquarters. Marcona Mining Company is owned by Utah Construction and Cyprus Mines Corporation.

Conrad W. Thomas, engineer for Texas Gulf Sulphur Company in Houston, Texas, recently inspected sulphur deposits in Peru. Mr. Thomas was employed by Cerro de Pasco Corporation at Oroya, Peru in 1940.

J. S. Hay is the newly elected president of the Association of Mine Managers in the Union of South Africa. He was named to succeed A. J. Cundill at a meeting in Johannesburg.

J. ELDON GILBERT, general manager of the Cordero Mining Company, was in Almaden, Spain during April in a special consulting capacity in regard to the new Pacific Foundry multiple hearth furnace recently installed at Almaden. Mr. Gilbert has been general manager of Cordero's mercury operations at McDermitt, Nevada for a number of years and is well-known to MINING WORLD readers as the author of the Mercury Review Section of the Yearbook.



Henry S. Wingate was elected president of The International Nickel Company of Canada, Ltd. at a recent directors meeting in Toronto. Succeeding Paul D. Merica, Mr. Wingate was also named to the presidency of the United States subsidiary, The International Nickel Company, Inc. He has been with the parent firm since 1942.

Thorsten Andersson, mining engineer with the Saudi Arabian Mining Syndicate, Ltd., has been promoted to mill superintendent at the company's Mahad Dahad mine in the Hejaz province of Saudi Arabia.

William P. Bittenbender, president of the International Selling Corporation, has been named president of the recently formed American Committee for the Centenary of the Industrial Production of Aluminum. Organized to cooperate with the Aluminum Centennial Congress, which is being held in Paris, June 14 to 19, the committee members include Russel B. Caples, president of Anaconda Aluminum Company; Kent R. van Horn, American Society for Metals and director of Alcoa's aluminum research laboratories, and Louis Lippa, vice president of Apex Smelting Company. The Congress will mark the one hundredth anniversary of the development of industrial aluminum and will include a program of scientific papers, visits to laboratories in and around Paris, and an exhibition dealing with 100 years of development in the industry.

Ian M. McLennan, general manager of the Broken Hill Proprietary Company, Ltd. in Australia, is in the United States. He is currently at the El Paso, Texas, copper-lead Smelter of the American Smelting and Refining Company.

E. C. R. Spooner is assisting the government of Ceylon in reorganizing its Department of Industries. While in Ceylon he is training personnel for the department. Mr. Spooner is a professor of mining, metallurgical and chemical engineering at the University of Adelaide in Australia.

T. E. Hopkins has returned to Idaho from Peru where he was employed by the Cerro de Pasco Corporation.

Hans Fredrik Winsnes, Norwegian mining engineer, is now working at Ulefoss, Norway. Mr. Winsnes previously was employed by Orkla Gruver, at Lokken Verk, Norway.

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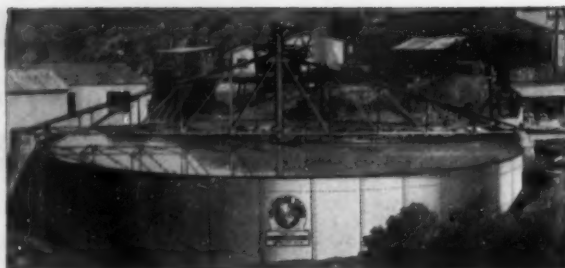


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ASARCO's Silver Bell Unit in Production; Initial Terms of DMPA Contract Are Fulfilled

Production has started at the Silver Bell Unit of the American Smelting and Refining Company, 40 miles northwest of Tucson, Arizona, following a 30-day trial run completed early in April. The Silver Bell development was made possible through a 1951 agreement with the Defense Materials Procurement Agency, which provided that the mine had to produce 150,000 tons of ore in a period of 30 consecutive days before May 28. This qualification was met and the agreement went into effect on May 1.

The DMPA contract provides a floor price of 24.5 cents per pound of copper, subject to adjustment for increases in operating costs, for 177,000,000 pounds out of the first 197,000,000 pounds produced. The total expenditure for stripping and construction was estimated at \$17,000,000.

During the trial run, production averaged over 5,000 tons of ore a day, the ore containing approximately 0.9 percent copper. When full production is attained, the company expects to mine about 7,500 tons of ore daily with an annual production of 36,000,000 pounds of copper. Concentrates are trucked a distance of 20 miles to Plata, a new shipping point north of Cortaro on the Southern Pacific lines, then hauled by rail to the AS&R smelter at El Paso, Texas.

The Silver Bell Unit consists of the Oxide and El Tiro open-pit mines, the former about one-half mile and the latter about 3½ miles from the millsite. Stripping of the ore body was contracted to the Isbell Construction Company, the townsite development to Utah Construction Company, and mill erection to Stearns-Roger Manufacturing Company. The entire project has been company financed with government assistance limited to rapid amortization of the investment for tax purposes and a price guarantee. The estimated life of the operation is 11 to 12 years, but the DMPA contract ends five and one-half years after May 1. About 250 workers will be employed at the unit.

T. A. Snedden is southwestern division manager for American Smelting and Refining Company, with offices in Tucson. D. R. Purvis is general superintendent in charge of Silver Bell.

Lead, Zinc Groups Report On Outlook at Conventions

Outlook for two fields of the United States mining industry was discussed at the annual conventions of the American Zinc Institute, Inc., meeting in St. Louis, Missouri, and the Lead Industries Association, which held its session in Chicago, Illinois. Leaders in the industry highlighted developments during the past year and made cautious forecasts about market possibilities in 1954. One outcome of the two conventions was a decision to hold a joint meeting next year in Chicago.

A belief that prospects for the lead market are better than they were a few months ago was expressed by Joseph Zimmerman, editor of the Daily Metal Reporter. Although consumption this year may be 10 to 15 percent below last year's total, Dr. Zimmerman, speaking to members of the Lead Industries Association,

doubted that the price would recede to the 12½ cent level that prevailed earlier this year.

Similarly, at the American Zinc Institute meeting, Jean Vuillequez, vice president of the American Metal Company, Ltd., observed that current world mine production of zinc, despite the decline in the price of zinc, is still running close to the level prevailing during 1951 and 1952.

A far less stable picture of the domestic zinc scene was drawn by Howard I. Young, president of the American Zinc, Lead and Smelting Company. Declaring that at the 10 cent level only 25 percent of the nation's needs can be supplied from domestic mines on a break-even basis, Mr. Young defined the long-time problem of the industry as "what can be done to prevent the recurrence of the events of the last few years in which the United States domestic zinc mining industry has had to absorb virtually all of the ups and downs in the world consumption of zinc."

As a solution to the immediate situation, he called for government purchase of a considerable part of the surplus zinc now in the hands of the producers, and as a long-range answer a protective tariff "not high enough to be burdensome to our customers or to those countries that we must depend on for imports but sufficient to bring the price of zinc up to a point where a reasonable percentage of our domestic mining industry can operate with a fair return on its investment and effort." He also warned the industry that the law of supply and demand must be obeyed and suggested that production rate similar to the percentage of capacity on which the steel industry operates could be adopted by producers.

Technical advances also were mentioned at both conventions. B. C. Bricker, E. I. du Pont de Nemours & Company, Inc., discussed a new use for lead—in porcelain enamel for aluminum. This vitreous enamel contains 30 to 50 percent lead and combines the good properties of glass with the lightweight workability and strength of aluminum. Also mentioned at the lead conference were various new prospecting methods by Norman Donald, Jr., geologist with St. Joseph Lead.

Base Metal Operators Form Philippine Group

Leading Philippine operators of base metal mines have formed an association to protect and to promote the interest of the base metal mining industry in the Philippine Islands.

Named the Base Metals Association of the Philippines, the principal purposes of the new organization are to promote and encourage the production, use, and sale of base metals in the country, as well as to assist in the exploration and development of base metal reserves. The association will undertake the dissemination of proper and correct information on mining, producing, and marketing these metals.

Members of the board of directors of the association are: Marino Olondriz, representing Consolidated Mines, Inc.; A. O. Boni, Philippine Iron Mines, Inc.; An-

thony M. MacLeod, A. Soriano y Cia.; Bernard Brandt, Luzon Stevedoring Company; Jesus S. Cabarrus, Acoje Mining Company; Manuel Elizalde, Elizalde & Co., Inc.; and Col. C. M. Smith, Atlas Consolidated Mining Company.

Argentine Law Regulates Foreign Investments

A new law has been passed by the Argentine government regulating the foreign capital invested in the country for the development of industry and mining.

According to the law, foreign capital invested in the country will be under the regulation of the Argentine legislature and will be given equal consideration with that of Argentine capital. Within two years of the date of recordation in the National Register, the investor will be allowed to transfer to his own country a net profit of an annual 8 percent over the registered capital. Each foreign investor will be allowed to capitalize the profits that have not been transferred by his own free will.

Within 10 years of the recorded date, the investor will have the right to withdraw his capital from the country by means of shares at an annual rate of from 10 to 20 percent, each case to be decided separately and at the time of authorization of the investment. Restoration of capital will only be made with funds belonging to the investor.

When authorizing entrance into the country of each investment, the government will be able to exempt, totally or partially, from customs duties any machinery, etc., that is imported. The government will also be able to declare of "national interest" the new activity settled in the country and to exercise in its favor all encouragement and defense measures passed by law.

Canadian Option Taken By Jones & Laughlin

Jones and Laughlin Steel Corporation, Pittsburgh, Pennsylvania, has taken a two-year option on Dominion Gulf Company's iron ore deposit six miles south of Kirkland Lake, Ontario, Canada. The option permits the American firm to conduct exploration work and lease the property if findings are favorable. Dominion Gulf, which has been negotiating with Jones & Laughlin for some time, is a Canadian subsidiary of Gulf Oil Company.

The deposit is a magnetic taconite ore of Keewatin type. Tonnages and grades are not known, but it is estimated that the property may contain a reserve of 150 million tons of crude open pit magnetic taconite ore. Aerial surveys were made in 1952 and a minimum diamond drilling program was carried out then.

Exploration is expected to begin this year. The company estimates that if a plant is built at the property about 10,000 tons of ore a day would be handled to produce 3,000 tons of pelletized concentrate daily.

Jones and Laughlin is also utilizing low-grade ore at its Benson Mines in New York and is producing iron ore from five Mesabi Range mines. It is also developing a large underground iron ore mine in northern Michigan.

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JAPAN—The *Japan Mining Company* reports that Japanese copper smelters are negotiating with *Hochschild Company* for imports of copper ore and concentrate from Chile. A contract has already been signed for delivery of 5,100 tons, with about 1,000 tons copper content. The Japan Mining Association says that Japanese production of electrolytic copper reached a post-war high of 10,197 tons in March; production in February had been 9,119 tons, and in December, the previous high, output had been 9,386 tons. One reason for the increase is attributed to the producers' haste to dispose of scrap copper on hand in anticipation of an easy market in the near future.

MALAYA—*Pacific Tin Consolidated Corporation's* net income before depreciation and depletion in 1953 was \$1,108,799, compared with \$1,633,993 in 1952. Malayan war damage awards for the year were \$127,320 in 1953, compared with \$604,853 in 1952. Four dredges continued to operate during the year with an increase in yardage dredged to 14,114,000 cubic yards, but recovery of metallic tin was 0.3 pounds per cubic yard, a decline from the 0.33 pounds recovered in 1952. The decline may continue in 1954 because one dredge does not have sufficient reserves in its area to maintain production during the year. Another property acquired in 1948 contains satisfactory values for dredging but guerrilla activity in the area has prevented its development.

PAKISTAN—An all-time production record of 23,600 tons of chromite was established in 1953 in Pakistan. Production in 1952 had been only 17,230 tons, and in 1947, the former record had been made with 20,000 tons. It is expected that further increases will be made this year.

INDIA—The *Central Provinces Manganese Ore Company* has opened its heavy media separation plant at the *Dongri Buzurg* manganese mine 80 miles from Nagpur. The plant is reported to be the largest of its kind in the Far East.

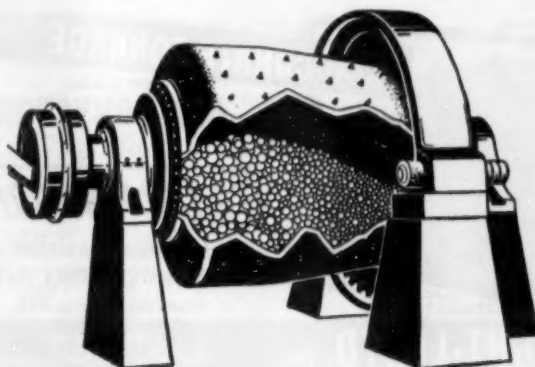
JAPAN—*Sumitomo Metal Mines Company* has discovered a promising ore body at the *Yaso* mine which it purchased in 1949 and has been exploring ever since. Ore reserves are estimated to be about 2,440,000 metric tons of chalcocite. From April to September 1953, the mine produced 6,800 metric tons of chalcocite ore containing 2.84 percent Cu. This was shipped to the Kunitomi copper mill located in Hokkaido. The company now has under construction a 250-ton mill at the mine which should be completed this year. If the mine continues to be profitable, the company plans to expand the mill to 500 tons per day.

MALAYA—The highest output of tin-in-concentrate for Malaya since liberation was produced in March with 6,636 tons. This was 2,359 tons more than in February. In January 5,108 tons were produced. The quantity shipped from the Federation to Singapore and Penang in March was 5,169 tons, compared with 3,825 tons in the previous month. The exporting states were Perak, 3,170 tons;

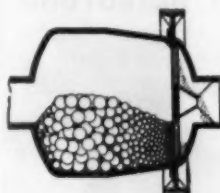
Selangor, 1,526 tons; Negri Sembilan, 155 tons; Pahang, 182 tons; Johore, 70 tons; Trengganu, 5 tons; Kedah, 30 tons; and Perlis, 31 tons. The total quantity of tin moved during the first three months of the year was 14,316 tons, compared with 14,368 tons for the same period of last year.

IRAQ—Negotiations are said to be under way between the government and the *Texas Gulf Sulphur Company* (U.S.) for the development over a 50-year period of the country's sulphur deposits. At present no actual mining of any type is being done in Iraq. The overwhelming importance of oil has retarded mineral developments, although during the past 20 years various attempts have been made to survey prospective regions and to as-

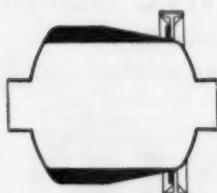
certain the country's mining possibilities. Such surveys and assessments were made both by foreign and by government organizations, but there has been a lack of a coordinated overall policy with the result that today there are widely conflicting opinions in regard to the worth of such investigations. At the present time, a foreign company is reported to be attempting such a coordination and assessment by thoroughly studying all previous reports, and by field investigations. On the basis of earlier reports there is a general feeling that the metallics are either too low grade or not present in sufficient quantity to warrant development. On the other hand, it is believed that the non-metallics, especially sulphur, gypsum, and asbestos, and various quarrying industries offer the best economic prospects.



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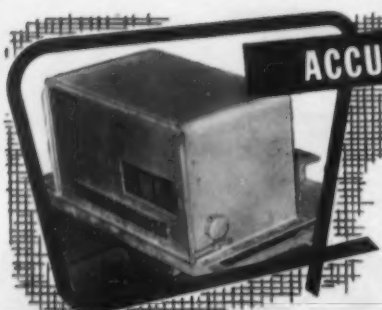
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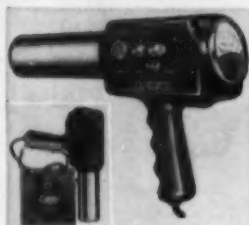
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Mining World's Exclusive Report on
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INTERNATIONAL

THAILAND—Tromal Prospecting Company, Ltd., which had signed an agreement with the Thai government in 1950 for a sole prospecting right in the sea between Bhuket and Pangnga for 2½ years, recently received three special mining leases covering an area of about 7,500 acres in the sea bottom near Bhuket. The company, which plans to work the area with a special dredge equipped with clamshell buckets, has offered the Thai government 45 percent of its shares.

SOUTH KOREA—Since the liberation of the country from Japanese occupation (about 1907 until 1945), mining production has steadily increased and it is soon expected to be the backbone of the Korean economy. Mining under the Japanese was by crude hand methods and only the highest grade ore could be mined. With the introduction of modern machinery and plants value of production in 1953 was over \$45,000,000; over 70 percent of this was from tungsten. The government anticipates an annual gross of \$200,000,000 after its improvement plan has been in operation for two years.

INDIA—The government is reported to have decided to nationalize the mineral sands industry in Travancore-Cochin. A Central and State Corporation is to be formed to take over the industry, and a provision of 2,000,000 rupees has been made in the 1954-1955 budget estimates for this purpose.

BURMA—Consolidated Tin Mines of Burma, Ltd. has received £33,946 as payment for the mineral concentrate extracted by the Japanese during their occupation of the area, and later recovered by the Burmese government upon reoccupation of Lower Burma. The British government has also paid the firm £530 (final ex gratia payment) for capital rehabilitation. The company has virtually disposed of its mining properties because no British employees have been permitted to visit the mines since 1950. Therefore, the company's operations have been restricted to the business of ore buying and the separation of mixed concentrates.

TURKEY—The drop in prices and demand for minerals on the world market has slowed down the operations of many Turkish companies, especially those producing chrome ore and manganese. On the other hand, individual prospectors are seeking other minerals not produced in Turkey until now, such as uranium, scheelite, and mica.



LATIN AMERICA

BRAZIL—New machinery being installed at the Sao Joao del Rei mines in Minas Gerais state is expected to increase production of gold considerably. Some estimates are that the annual output of 4,000 kg will be doubled by the improvements.

MEXICO—Cia. Minera la Trinidad S.A. has organized a company which will construct and operate a manganese concentration plant at Nombre de Dios, Chihuahua. The plant will have a capacity of 1,000 tons daily yielding a 40 percent Mn concentrate. Its purpose is to cater especially to small-scale miners who have

MINING WORLD

had difficulty in marketing their low-grade ore

PERU—*Cerro de Pasco Corporation* is distributing its annual report in a special Spanish translation this year (in addition to English) for the benefit of its many stockholders in Peru, where the company's mining, smelting, and refining operations are located. The translation is available to any stockholder who requests a copy. The company reported that dollar sales and net last year were sharply under the 1952 volume, although output rose, costs were reduced, and sales volume of all ores but copper and low-grade zinc was practically equal to production. Two production records were made during the year—130,199,496 pounds of zinc were produced, nearly 22,000,000 pounds more than in 1952; and 19,461,808 pounds of slab zinc, almost double 1952 output.

BRAZIL—Several important beryl deposits were recently discovered near Itambe, Bahia state. About 300 metric tons have already been exported to the United States and another 300 metric tons have been stockpiled in the mines. Large amounts of columbite are also reported to be present.

BOLIVIA—*Patino Mines & Enterprises Consolidated, Inc.* reports that it has received the equivalent of only \$8,797 from the Bolivian government in the 16 months since the government seized the company's tin mines. During that same period the government produced 14,440 long tons of fine tin concentrate valued at about \$24,000,000. The company had a loss of \$44,260 last year on revenues of \$319,052 coming mainly from liquidation of tin concentrates. Under an agreement signed in March 1953, materials worth \$429,523 were shipped to the Bolivian agency operating the mines. Bolivia, in turn, was to pay for the materials but so far has not done so. However, Bolivia did release 997 tons of Patino tin at a Chilean port which was shipped to England for smelting.

CHILE—*Anaconda Copper Mining Company*, in reporting an 8.03 percent decrease in gross income and 23.64 percent drop in net income for 1953, attributed the loss to restrictions placed upon marketing of output by the Chilean government. *Anaconda's* two subsidiaries in Chile are *Chile Exploration Company* and *Andes Copper Mining Company*. The Chilean government ruled that an increase in income taxes from 50 to 60 percent was applicable to 1952 income tax payments and assessed an additional tax of \$3,426,405. The payment was made under protest, charged to surplus in 1953, and is not reflected in earnings statements.

PERU—The exploration work being conducted by *Utah Construction Company for Republic Steel Corporation* is expected to continue for another six months. The 30,000 hectare concession has been optioned from *Pan American Commodities, S.A.* of Lima, as a potential iron ore deposit. Diamond drilling is being conducted in two 10-hour shifts, with John Jepsen in charge. Work has also been done on five small exploration tunnels under a subcontract with *Mine Management S.A.*

MEXICO—The Ministry of National Economy is developing methods for working various virgin mineral and metal tracts, and mines that were abandoned because operations were unprofit-

able. The Ministry's mining engineers are now examining some of these tracts and mines in Guanajuato and Durango.

BRAZIL—*Thurman & Wright*, a United States firm, is a participating investor in a Brazilian company, *Dragagem de Ouro Ltd.* A nine-cubic-foot connected bucketline dredge has been erected on the Rio das Velhas approximately 22 miles from Belo Horizonte in the state of Minas Gerais; the dredge is now in operation.

BOLIVIA—A survey of mineral deposits and rock formations in eastern Bolivia has revealed evidence of possible uranium occurrences. The survey indicated that certain areas are similar to formations in New Mexico, Colorado, Portugal, Northern Rhodesia, Brazil, Wyoming, etc., where uranium was found to be present.

PERU—*Marcona Mining Company* has purchased a twin-engine Beechcraft D-18 airplane which will be used to ferry personnel, supplies, and equipment between Lima and the port of San Juan where the company has constructed an asphalt runway. *Marcona* is a joint operation of *Utah Construction Company* and *Cyprus Mines Corporation*.

MEXICO—At *American Smelting and Refining Company's Nuestra Senora* lead-zinc-silver property, Cosala, Sinaloa, construction of the mine surface plant, power plant, mill, and town site is almost complete. Preparation of the mine for production at a rate of 12,000 tons of ore per month was delayed by a heavy un-

derground water flow, requiring filling of water courses with cement grout and installation of additional pumping equipment. It is expected that a permanent truck road from the mine to the railroad will be finished this year. Exploration and development of the *Rosario* lead-zinc property at Rosario, Sinaloa, continues with favorable results. Design work for a mill and surface plant is also in progress. At the *Dolores* mine, a fire last year has caused abandonment of the southern portion. The remaining ore is of minor value, so the firm has applied to the Mexican government for permission to abandon all operations. Notice has been given to the *Michoacan Railway and Mining Company, Ltd.*, owner of the property, of cancellation of ASARCO's lease effective December 31, 1954.



TASMANIA—*King Island Scheelite (1947) Ltd.* at Grassy, King Island, has completed an extensive diamond drilling program in the hanging wall of the ore body. Ore reserves are now calculated at 3,242,000 tons to 110 feet below sea level. Diamond drilling has started to the west of the present ore body and will continue for at least a year. The presence



Sulphur Plant Opens in Baja California

Production of the first commercial sulphur on the Pacific Coast began in April with the opening of the *Texas International Sulphur Company* plant at San Felipe, Baja California, Mexico. Pictured above (left to right) Victor Dykes, president of the firm, receives from J. H. Pollard, chief engineer, the first slab of pure sulphur processed at the plant. Also present is Joaquin Noriega, plant administrative manager. The operation, 125 miles south of the United States border, is the only one on the North American continent now producing commercial sulphur from surface ore. Initial production will be at the rate of 700 tons per month, but the plant has been designed to permit the capacity to be doubled. *Texas International* also holds exploratory and mining rights to sulphur concessions in the Isthmus of Tehuantepec, Veracruz, Mexico, where it began core drilling last month. Drilling operations are being confined to an area where surface geology has positively indicated the presence of salt structures in which sulphur is commonly found. The property is adjacent to properties where *Mexican Gulf Sulphur Company*, *Pan American Sulphur Company*, and *Central Minera, S.A.* have found high-grade native sulphur deposits.



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BRANCH OFFICES AND WAREHOUSES THROUGHOUT NORTH AMERICA

INTERNATIONAL

of some scheelite mineralization and favorable geological formations indicate that a repetition of the body may exist. The long-term future will benefit greatly if increased tungsten prices are maintained.

PHILIPPINE ISLANDS—*Philippine Iron Mines* at Larap in Camarines Norte broke a record in March regarding delivery of ore to various Japanese steel mills, with delivery of 81,759 wet metric tons, averaging 56.88 percent Fe and 0.665 percent S. Production during the period was 74,057 wet metric tons, 33,437 tons of which were mined in Pit No. 2, 15,000 tons from other sources in the mine, 4,979 tons by contractors, and 4,559 tons from outside properties. In addition to this, 17,557 tons were produced by underground operations.

QUEENSLAND—Copper production by *Mount Isa Mines, Ltd.*, was 2,010 tons of blister in March. Regular shipments are now leaving Townsville for refining at Port Kembla, New South Wales. At present, refining is electrolytic but further work on fire refining is said to be contemplated. Mount Isa recently staked considerable areas about 25 miles northwest of Mount Isa where uranium is believed to be present. Samples taken from the field have been described as having a "very intense reaction" to Geiger counters.

PHILIPPINE ISLANDS—A committee appointed by President Magsaysay to study the problems of the gold mining industry has recommended a Pesos 16,000,000 annual subsidy for operating gold mines. They have recommended a direct subsidy of Pesos 41.72 per ounce to marginal mines (having very low-grade ore), and Pesos 35.40 per ounce to non-marginal mines. It was suggested that the proposed subsidy be raised from revenue presently being derived from gold mining operations which would amount to around Pesos 14,500,000 annually, and from the sale of gold in the Free Market. The Committee also asked the monetary board to look into the possibility of amending the charter of the Central Bank so that the gold certificate plan could be adopted as an alternative measure should the subsidy program prove to be burdensome for the government.

TASMANIA—The Commonwealth Tariff Board is considering applications for tariffs on copper and tin. First hearings were in Melbourne, Victoria, early in March. Further hearings are being held in Sydney, New South Wales, Brisbane, Queensland, and again in Melbourne. Tasmania's producer, *Mount Lyell Mining and Railway Company, Ltd.*, has most to gain from a tariff and, indeed, is considered to require a tariff in order to survive. The company is asking for a £A340 for its copper (other producers want £A340 for electrolytic copper). Copper consumers favor a bounty rather than a tariff. In the case of tin where there are several important producers, all of whom have their concentrates treated by custom smelters, producers want a tariff but the smelters favor a bounty.

PHILIPPINE ISLANDS—A new mining firm, *Sulu Minerals*, is being incorporated to thoroughly explore and develop high-grade copper deposits discovered recently at Port Languyan, Tawitawi Island, in the Sulu archipelago. R. H. Johnson is president of the Filipino-American company. He says that assay reports have shown copper contents ranging as high

as 28 percent, plus varying amounts of gold and nickel. Because of the terrain and the deep-water shipping point located within one mile of the ore deposits, ore handling costs can be kept to a minimum.

WESTERN AUSTRALIA—Hill 50 Central N.L. has been organized to "acquire, explore, test, and where warranted, develop" gold mining leases near Mount Magnet in the Murchison goldfield. Among leases to be taken over is the *Perseverance*, which adjoins the now famous Hill 50 mine. Perseverance carries host rocks (jasplite) similar to those in the main Hill 50 workings. In addition to Hill 50 Central, Hill 50 Extended was also recently formed to test the leases in the Mount Magnet district. Dr. M. D. Garretty is consulting geologist for Hill 50 Central. H. E. Munn is one of the directors.

INDONESIA—N.V. *Algemeene Industriële Mijnbouw-en Exploitatie Maatschappij* (A.I.M.E.) has been operating in Indonesia for many years. The firm has been interested in manganese, sulphur, and phosphate deposits, but until now has only been producing manganese. However, they soon hope to begin development of sulphur.

PHILIPPINE ISLANDS—Technicians have started to drill the Pesos 30,000,000 *Elizalde* copper mine in Sipalay, Negros Occidental, which experts are reported to have described as about the biggest of its kind in the Far East. Ricardo Jimora, a representative of *Elizalde and Company's* interests, estimates that the mine is capable of a daily output of 5,000 tons after a year's operation. Mining could be by open pitting.

SOUTH AUSTRALIA—Because of increased output of concentrates from the mines at Broken Hill, New South Wales, the lead smelter and refinery at Port Pirie owned by the *Broken Hill Associated Smelters Pty. Ltd.* is approaching capacity throughput. Lead production is at an annual rate of 220,000 tons. One reason cited for the increasing production at the mines is the lower lead price bonus at Broken Hill which causes contract miners to work harder to maintain earnings.

NORTHERN TERRITORY—The British-owned *Rio Tinto Mining Company* is reported to have applied to the Australian government for a license to prospect for uranium in the Northern Territory. The firm's chief executives and geologists have already visited the Territory and spent several weeks in the Darwin area. The company's chief geologist in charge of uranium development, P. W. Pegg, has been sent from South Africa to Australia, and he is said to be going to the Territory to prospect a large holding which the company hopes to obtain.

PHILIPPINE ISLANDS—The geological survey and systematic sampling of the manganese deposits of Anda Peninsula in Bohol are progressing according to plans, reports the Director of Mines Benjamin Gozon. Preliminary results of the survey show that several million tons of low-grade manganiferous material exist, and the grade is probably somewhat lower than originally believed, possibly averaging 10 to 15 percent manganese.

WESTERN AUSTRALIA—*Champagne Syndicate N.L.*, a subsidiary of *Western Mining Corporation Ltd.*, has bought the mine of Mount Charlotte (*Kalgoorlie*) *Gold Mines Ltd.* Champagne Syndicate will probably not undertake mining oper-



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ations until conditions for the gold mining industry in Australia improve.

PHILIPPINE ISLANDS—The rich mineral district of Benguet had 427 registered mineral claims including seven placers during the past year, reports the Baguio mining recorder's office. Prospecting is still going on with more claims expected shortly; old claims on which no assessment work has been done are being relocated. The increased prospecting is caused by the rising demand for both gold and copper on the world market.

INDONESIA—The Republic of Indonesia has signed its first trade agreement with Communist China. Among the items Indonesia will export to China are tin and bauxite. The agreement lasts until December 31, 1954, but can be extended by mutual consent before it expires.

NEW ZEALAND—The existence of a pyrite deposit is being investigated by the New Zealand Mines Department and the Department of Scientific and Industrial Research. The deposit is reported to be located near Thames on the Coromandel Peninsula and estimated to be a quarter of a mile wide.

PHILIPPINE ISLANDS—A British firm, *Hunting Geophysics Ltd.*, is conducting an aerial search for unknown mineral deposits in the Philippines under a contract partially financed by the Foreign Operations Administration. The Philippine government requested FOA cooperation in the project in an effort to discover important deposits of iron to meet rapidly increasing export demands. Completion date for the project is April 30, 1955.



EUROPE

YUGOSLAVIA—Orders for mill equipment for the new 12,000-ton-per-day copper flotation mill of the *Bor Company* have been placed in the United States with the *Western Machinery Company*. Three 72-inch spiral duplex classifiers, ninety 62-inch Fagergren rougher flotation cells, fifteen 66-inch Fagergren cleaners and recleaners will be used in the copper circuit. In the pyrite circuit sixty 62-inch cells will be used for roughing and eight 66-inch machines for cleaning.

SWEDEN—The *Graengesbergs* company which exports most of Sweden's iron ore abroad, is planning to increase its tonnage from 11,000,000 to 18,000,000 tons a year. The increases will come from the *Kiruna* and *Malmberget* mines where mining changes are being made. At the *Kiruna* the company is switching from the present open-pit method to underground workings. A new mine under construction at *Kiruna* is expected to be completed in 1960, increasing output at *Kiruna* from 8,000,000 tons annually to 12,000,000 tons. In *Malmberget*, underground work will be centralized. Larger tunnels will be driven leading to sorting bays and transport bases. Output here is expected to increase from less than 3,000,000 tons to over 4,500,000 tons a year.

ENGLAND—In the northwest, drilling has disclosed substantial beds of anhydrite extending under the sea from the

MINING WORLD

mainland near St. Beeshead in Cumberland, somewhat similar to those proved on the east coast of England. A £2,000,000 plan to develop chemical plants at Whitehaven using the anhydrite for manufacture of sulphuric acid is reported. This expansion is in addition to the proposed expansion of the *Imperial Chemical Industries* operation at Billingham on the east coast.

FRANCE—The 100th anniversary of the *Société de l'Industrie Minérale* will be celebrated in Paris from June 20 to July 3, 1955. Both French and foreign specialists in the mining and metals industries are invited to attend the Centenary Congress. The program includes an international exhibition of mines and metallurgy; visits to French industrial fields; and specialized session on mining, iron, and steel.

AUSTRIA—The very cold and snowy weather hindered production of iron ore in Austria during January, especially in the open pit areas of the Erzberg (Ore Mountain). The total monthly production of iron ore amounted to 166,560 metric tons, mined by 4,334 workers. Lead-zinc ores were mined to reach a 9,834-ton level; copper ore totaled 13,603 tons. Only 344 tons of antimony were mined; no bauxite was produced during that month at all; and 50,069 tons of magnetite were produced.

RUMANIA—According to a statement made by the Rumanian Prime Minister, 1953 production of steel reached about 760,000 metric tons, as compared with 750,000 tons during 1938. The 1955 production is scheduled to be about 1,000,000 metric tons.

ENGLAND—In Cornwall, both the *South Crofty* and *Geevor* tin mines continue normal production, with a slight increase in the output from the former mine. At Geevor, the new galvanized head frame has been erected at Victory shaft, and the installation of a new electric hoist is under way.

CYPRUS—A portion of the *Esperanza Copper and Sulphur Company's* new treatment plant has been in operation for a short time, producing high-grade pyrite concentrates with a sulphur content of over 49 percent. The company is trying to improve facilities for loading of ore shipments by providing new tug boats and barges, and by modifying the jetty at Mavroli Harbor installations at Cyprus are considered to be very poor, and a mission of British port experts is expected to be sent to Cyprus to study the possibility of converting Limassol salt lake into a large modern port.

SWEDEN—The concentrating plant at the *Semla* mine belonging to the *Fagersta* company was destroyed by fire. It will be replaced by a new one which, however, will be located at the *Rud* mine of the same company. A haulage tunnel is being driven to connect the two mines.

HUNGARY—Claims issued by the Hungarian officials that the nation produced 1,500,000 metric tons of steel during the past year, are labeled unbelievable by Central European experts. Basis for this opinion is the lack of official comparative data for 1952. Raw iron production reportedly amounted to 760,000 metric tons during 1953. Again no official increase percentages are given. Rolled goods produced amounted to 840,000 metric tons.

NORWAY—Norway's biggest aluminum plant, at *Sundalsora*, has started

producing but will not reach full production until next year because of delays in the completion of the *Aura* hydro-electric plant which will supply the necessary power. The *Sundalsora* plant will produce about 40,000 tons of aluminum per year when in full production, almost doubling present Norwegian output which is about 52,000 tons per year. A loan from the United States Economic Cooperation Administration will be repaid in aluminum deliveries.

FRANCE—Iron ore production last year totaled 42,400,000 tons, compared with 16,200,000 tons in 1948. An extensive modernization program in the *Lorain Basin* has brought about the tremendous increase. Unlike the *Mesabi Iron Range* in Minnesota which is mined by open pit, this is entirely an underground operation, using room-and-pillar stoping. There are 52 shafts in the basin, plus 23 mines worked through hillside adits. Only three mines have open pit workings. Currently a second five-year program is under way at a cost of \$120,000,000, and designed to produce more than 52,000,000 tons by 1957. Most of this money will go toward mechanization in the mines. Already over 500 loading machines are in use compared with 84 in 1938. Also in use are 220 loading ramps, about 120 special bulldozer trucks, 23 crushers, and mine cars with a capacity of 6 to 11 tons instead of the former 1.5 to 2 tons. Without exception the productivity index has increased steadily and constantly for each six-month period since 1945.

EIRE—As a result of a survey made in *Sligo* and *Galway*, further drilling is planned which will be done by a local team under the direction of the state mineral company known as *Mianraí Teoranta*. Mining for both lead and copper was carried out many years ago in one of these areas. In *Galway* the area to be further prospected is at *Murvey* near

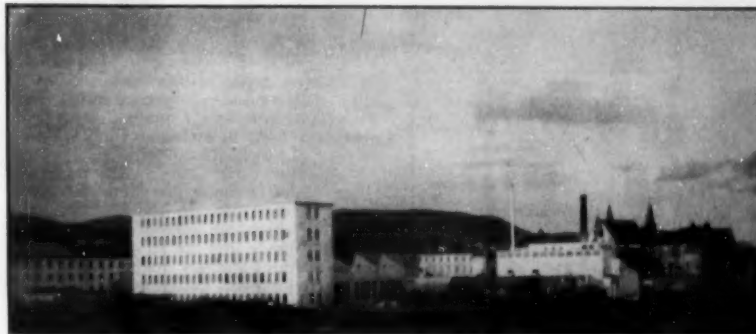
Roundstone, and it is understood that *molybdenite* is the chief mineral sought.

POLAND—An agreement defining terms of payment covering trade in 1954 has been signed between the *National Bank of Poland* and the *Bank of Greece*. Polish exports to Greece will include coal, machinery, textiles, glass, china, etc., while Greece will send pyrite, zinc concentrates, iron ore, tobacco, rice, etc.



MANITOBA—Delays have postponed operating of the new *Fort Saskatchewan* chemical metallurgical plant which *Sheritt Gordon Mines Ltd.* is erecting to treat its *Lynn Lake* nickel and copper concentrates. Originally scheduled to begin production in April, the firm now hopes to get under way this month, with nickel metal production starting in July. Overall cost of the entire project, including development of the mine, has increased 33.6 percent over the original estimate—or from \$35,029,000 to \$46,799,000. The "A" mine is now prepared for full production and the "El" mine is almost ready. The *Lynn Lake* concentrator has been handling about 1,700 tons per day, and will reach full rated capacity of 2,000 tons daily when the "El" mine goes into full production.

ALASKA—British Columbian interests are reported to have optioned 27 claims in the Upper Texas Creek area north of *Hyder* in southeastern Alaska. Organized as the *Douglas Mining and Development Company, Ltd.* of Vancouver, British Columbia, the claims it will work include the *Ibex*, *Snowshoe*, *Sunset*, *Morning*,



New Ore Dressing Lab Most Modern In Europe

A new ore dressing laboratory, said to be the most modern of its kind in Europe, has been added to the facilities of the *Norwegian Technological University* at *Trondheim, Norway*. The *Society for Industrial and Technical Research*, which planned and directed the construction work, transferred title to the University in a ceremony in December attended by leading representatives of the nation's mining industry. In addition to offices, auditoriums, and workshops, the five-story building (predominating in the left foreground above) contains a large ore dressing test center and several smaller laboratories. There are also accommodations for the Institute of Mining and the Institute of Metallurgy. Located near the main building is a smaller one which houses ore crushing machinery, storage bins, etc. Headed by *Dr. Magne Mortensen*, the ore dressing lab will first attempt to develop methods of treating iron ore from the *Dunderland* fields and pyrite from *Grong*. These relatively low-grade ores are available in huge quantities; about 25 tons each were recently shipped to the lab for test. Other projects will involve ways of improving present methods of refining niobium-rich "sevit" limestone found in *Telemark* province, and pilot dressing of 20 tons of graphite from the large *Jennestad* deposits in the *Lofoten* Islands.

and Blasher Extension groups. They are known to contain gold, silver, copper, lead, manganese, and molybdenum.

LABRADOR—With the first shipments of iron ore from the *Iron Ore Company of Canada's* Knob Lake deposits scheduled to be delivered to the United States around August 1, preparations are being made by *Hanna Coal & Ore Corporation* to have three ocean-going ore carriers ready to transport the ore. By 1956 Hanna hopes to have two more ocean-size freighters in service for that area. The company also plans to charter approximately 50 small Canadian freighters to transport the ore to Great Lakes port from Labrador. Hanna holds an interest in the *Iron Ore Company*.

BRITISH COLUMBIA — *Western Tungsten Copper Mines, Ltd.*, operating near Hazelton, is back in production following repairs to an upper tramline terminal destroyed by fire. During the shutdown, the mill was overhauled and a concrete floor laid. W. N. Taylor is mine manager.

SASKATCHEWAN — *Rix Athabasca Uranium Mines Ltd.* reports that it has been in crude ore production since April 7 at its Beaverlodge Lake property. Daily deliveries have been increasing gradually to a present rate of 100 tons. The company indicates it is satisfied with the rate of production and grade.

NEW BRUNSWICK—Fire totally destroyed the new mill and most of the surface plant just before official dedication of the mill was to be held by *Keymet Mines* near Bathurst. The headframe was also destroyed but the office, compressor and hoist house were saved. Rebuilding will be undertaken immediately. The company also plans to deepen the shaft another two levels while construction of the mill is going on.

BRITISH COLUMBIA—*Yankee Dundee Mines, Ltd.*, formed in 1952 to develop the *Yankee Girl* and *Dundee* mines east of Ymir, has cut the *Yankee Girl* vein in its low level Wildhorse Creek adit at an added depth of 765 feet. The vein

was seven feet wide where intersected and carried four feet of lead-zinc-silver mineralization on the hanging wall. Ralph Sostad is managing director.

ALASKA—Jim Pitcher and Bill Hibbard of Ketchikan have staked a pumice deposit at Princess Bay, 26 air-miles from Ketchikan. Mr. Pitcher discovered the deposit many years ago; recent demands for building materials revived his interest in working the deposit.

BRITISH COLUMBIA—*Jackson Basin Mining Company, Ltd.*, which suspended operations at its lead-zinc property in the Slocan district after nearly completing a 50-ton concentrator, has acquired 18 claims in the new Manitouwadge copper-zinc-silver camp in Ontario. Nine of the claims have been optioned to *Estella Mines, Ltd.* Exploration is expected to start soon.

ALASKA—A dispute over title to a group of nickel claims on Yakobi Island was decided in favor of the plaintiff Flynn. The defendant Vevelstad claimed that he had located claims on the ground prior to Flynn's staking, that the claims were still in force, and that Flynn was trespassing. Flynn testified that he had staked the claims in 1952 in full compliance with the requirements of law and that the ground was open because of a lack of evidence of claim notices, markings, or assessment work. The court ruled in favor of Flynn, agreeing that Vevelstad's location certificate descriptions of the situations of his claims were inaccurate, and that his markings of claims boundaries on the ground were insufficient.

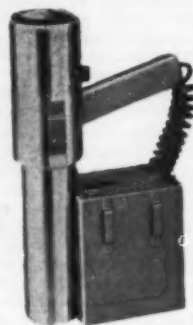
BRITISH COLUMBIA — *Cody-Reco Mines* is developing four former producers at Sandon, and stockpiling development ore. Work has been going on at the *American Boy, Deadman, Noble Five*, and *Slocan Sovereign* mines. Ore stockpiled, blocked out, and estimated is reported at more than 750,000 tons. A new underground Diesel locomotive has been purchased. James Taylor is company president, and D. M. Kline is consulting engineer.

QUEBEC—*Fenimore Iron Mines Ltd.'s* 7,000-acre group of base metal claims in the Ungava-Labrador area are being given to a new firm, *Ungava Copper Corporation Ltd.*, in exchange for 2,000,000 shares of stock. These will be allocated in the ratio of one Ungava share for every four Fenimore shares. Fenimore holds extensive concessions in the Ungava area where "almost unlimited" tonnages of medium-grade iron ore on surface and on or near tidewater are under exploration and development. Last summer Fenimore ground parties working to the north of the company's concessions reported the first Ungava base metal finds of importance and staked the 7,000-acre area. The showings are described as massive sulphides, all carrying copper, some zinc, low nickel, as well as gold and silver.

BRITISH COLUMBIA—*Bon Ton Syndicate* has approved diamond drilling to determine depth and size of ore deposits indicated by surface work six miles east of Creston. In the Lardeau district, *Sunshine Lardeau Mines Ltd.* has suspended milling operations pending new smelter arrangements but is shipping high-grade oxidized silver-lead ore. The mill suspension resulted from a 50 percent reduction in amount of concentrates accepted by the Bunker Hill and Sullivan Mining and Concentrating Company's smelter at Kellogg, Idaho.

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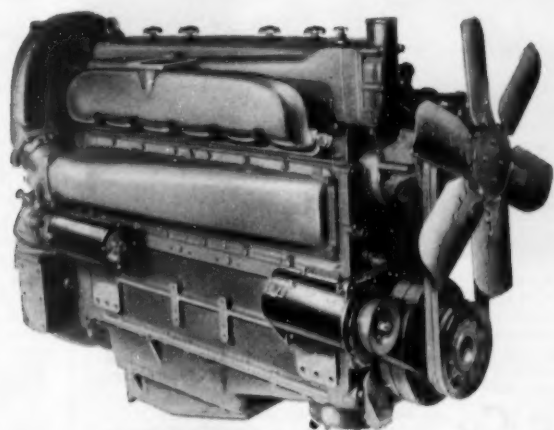
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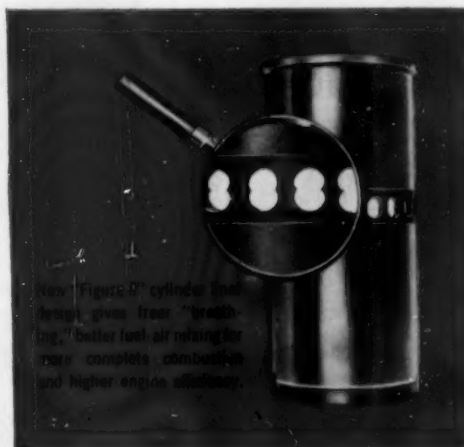
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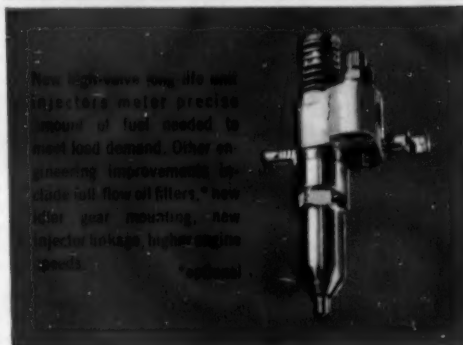


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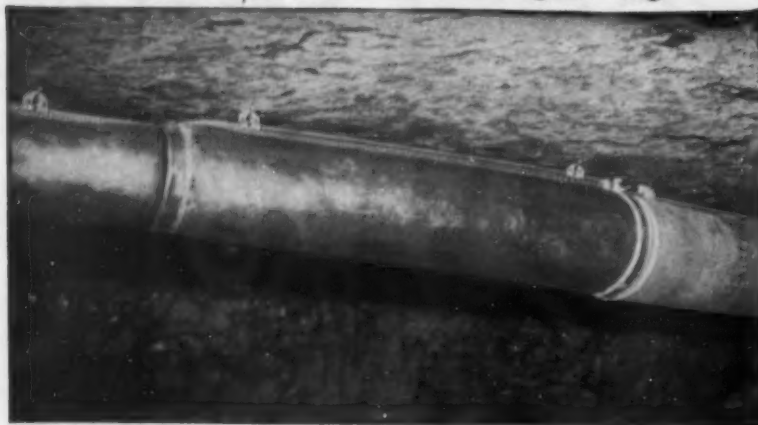
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ALASKA—Alaska Juneau Gold Mining Company has asked its stockholders to amend its articles of incorporation to enable it to go into another business. Activities are now restricted to "mining, smelting, reducing, refining, and working of gold or other ores." Tired of waiting for the price of gold to increase, the firm is considering among other things the production of wood pulp in Alaska.

ONTARIO—The new smelter at Cobalt, Ontario is now in operation treating 15 tons of concentrate daily. Its annual capacity is 3,000,000 ounces of silver, 1-200,000 pounds of cobalt, and 600,000 pounds of nickel, together with byproducts. The smelter is managed by *Quebec Metallurgical Industries*, a subsidiary of *Frobisher Ltd.* All production from the area goes to the new smelter which serves as an agent for the Ottawa Department of Defense Production. The concentrates and ores purchased are being treated for the United States General Services Administration on a fee basis.

ALASKA—All new mining operations are now exempt from Territorial mining license tax for a period of 3½ years from date production begins. New operations are defined as those starting production after January 1, 1953, or who have not been liable to pay the mining license tax since January 1, 1948. The act does not apply to mining of sand and gravel. Date of beginning production is that on which the first shipment of mine product is made. Miners who qualify should contact the Commissioner of Mines.



AFRICA

UNION OF SOUTH AFRICA—The Mining Leases Board is considering the application of *East Rand Proprietary Mines* for undermining rights to two additional areas of 1,378 and 1,505 claims each. When granted, these two areas will constitute extensions to the present mining property of 7,357 claims. During last year development work was continued eastward and in depth at the eastern and central sections. Satisfactory values were disclosed. Incline shaft sinking in those sections proceeded satisfactorily and stopping operations were started from three pilot winzes. It was possible to advance only limited development in the western section because of the shortage of non-European labor. Permanent equipment has been installed at the southeast vertical shaft, and preparations made for the sinking of the counterpart subvertical shaft. Preparations have also been made for installation of permanent equipment in the central subvertical shaft. Despite the improved electric power supply during the second half of 1953, the labor shortage throughout the year caused a decrease in tonnage milled by 178,000 to 2,273,000 tons, but the yield was raised to 4.458 from 4.314 dwt.

SOUTHWEST AFRICA—*Uis Tin Mining Company (South West Africa) Ltd.* estimates its claims and mining areas in the Uis and Omaruru districts to contain about 25,000,000 tons of ore down to a depth of 100 feet. Development work in 1953 was hampered by delayed deliveries of steel, equipment, and materials, and

MINING WORLD

by a critical labor shortage. By the beginning of this year many of these difficulties had been overcome and production had been raised to a little more than 50 percent of capacity. The staff position has improved and it is hoped that output will steadily expand. Assays of the tin concentrate have disclosed 2 to 8 percent tantalum-columbium pentoxides and an indicated average between 3 and 4 percent. Large pegmatites located 7 to 10 miles south of Uis have been prospected with indications that tantalite-columbite predominates and that the cassiterite occurs as a minor constituent. Test results are awaited. The company has a contract with the United States for the supply of tantalite-columbite.

NORTHERN RHODESIA—Rio Tinto Mining Company, through its subsidiary *Mineral Search of Africa*, has been exploring in Northern Rhodesia for some time after having been granted prospecting rights last year in four areas of that territory. The company is using modern methods of air search, supplemented by the work of ground parties and it is now reported that they have found large manganese deposits at Chiwefwe in the Kapiri district. Chiwefwe lies about 70 miles southeast of Ndola near the southern extremity of the Belgian Congo border.

UNION OF SOUTH AFRICA—The Platinum Prospecting Association No. 3 continued underground exploration of the *Boschkoppie* property in the Rustenburg district, Transvaal, during 1953. It also reopened and resampled old workings in its Brakspruit property about 25 miles southeast of the Boschkoppie property. Diamond drilling and underground development at Brakspruit is being continued to a limited extent. The *Transvaal Consolidated Land and Exploration Com-*

pany, which has a 45 percent interest in the association, has leased out some of its properties for the development of asbestos, chrome, and tin deposits.

NIGERIA—Amalgamated Tin Mines of Nigeria produced 1,186 tons of tin concentrate and 269.75 tons of columbite concentrate during the quarter ended March 31, 1954. Total mine output for the financial year ended March 31 was 4,421 tons tin concentrate and 916.25 tons columbite concentrate. For the same period ended in 1953, production was 4,980.75 tons tin concentrate and 578.25 tons columbite concentrate.

SOUTH WEST AFRICA—Recent operations in the manganese deposits of *South African Minerals Corporation* have further confirmed their extent and long life. Drilling has shown that the ore persists to a greater depth than previously expected. However, despite the additional equipment and other facilities made available for the production of 10,000 tons a month, this goal has not been reached. One reason was the poor labor situation in 1953 which has now somewhat improved. The firm continues to peg additional areas in its reservation of 350 square miles. One of the shafts in the nickel property located in the Rustenburg district of the Transvaal has been dewatered and samples of the ore have been taken to determine the best method of treatment.

UNION OF SOUTH AFRICA—The Durban Roodepoort deep mine on the West Rand has applied for an undermining lease on 750 claims adjoining the western portion of its southern boundary. Additional equipment was installed in certain of the mine's shafts, and shaft sinking during 1953 was mainly in the No. 1 east incline, the No. 6A subverti-

cal, the No. 8 incline, and the No. 9 incline. The No. 8 and, when completed, the No. 9 serve the Kimberley Reef horizon. Although the mine is drawing a substantial tonnage from the Kimberley Reef horizon within its existing mine property, outside of this area on the farm Klipspruit 11 a borehole drilled to determine the depths and economic importance of the Kimberley, Bird, and Main Reefs was stopped at 6,238 feet after passing through the Kimberley Reefs without disclosing payable values. Six additional boreholes in the western area of the mining property disclosed no encouraging values in the Bird Reef Series.

SOUTH WEST AFRICA—The South West African associate of Industrial Diamonds, Lorelei Copper Mines Ltd., should have its new 100-ton-per-day flotation plant in operation as this goes to press. The grade of ore mined indicates a production capacity equivalent to 100 tons of copper a month. Treatment will involve the leaching of malachite and the flotation of sulphide ores. The first leaching tank to hold over 1,000 tons of ore has nearly been completed. The company apparently intends to smelt at the mine, and to ship the raw metal bars overseas for refining. Prospecting has disclosed an extensive mineralized zone; with a sulphide ore body located at 14 feet, sampling showed 3.4 percent copper over 15% feet and also containing molybdenum, gold, and silver. An incline shaft has been sunk 70 feet and driving is being advanced to prove the full extent of the lens.

SOUTHERN RHODESIA—Messina (Transvaal) Development Company is sinking an 8-foot-diameter circular shaft at the *Umkondo* copper mine which it purchased last year. Dewatering of the



Famous Japanese Mine Closes After 2,000 Years

Sado, Japan's most famous gold mine, has been closed and its steam electric plant dismantled and shipped to the new Toledo copper mine in the Philippine Islands. The pictures above were taken by George T. Scholey, chief engineer for the Atlas Consolidated Mining and Development Corporation, when he visited Sado Island, off the west central coast of Honshu, last year, to inspect the power plant. He found it suitable for power generation for the new 4,000-ton-per-day Toledo copper flotation mill Atlas is building on Cebu. The picture at left shows how the Sado vein has been stooped completely to surface. The picture at right shows the 2,000-ton-per-day flotation plant. Mr. Scholey reports that for the Japanese mining industry Sado is comparable to the Homestake in the United States and the Hollinger in Canada. First gold recovery on Sado was over 2,000 years ago. Over 400 years of mining are well recorded. Early day mining

of high-grade ore developed several millions of tons of 2.5 to 4.0 grams per ton gold ore. In 1934 the 2,000-ton mill was started. Costs were only equivalent to 2.0 grams per ton. The ore also averaged 0.30 percent copper so the mine was operated at capacity during World War II. Because post-war costs made operations impossible, the mine closed depriving most of the island's population of their means of livelihood for jobs in the mine had been passed down from generation to generation. The Mitsubishi Mining Company, owners of Sado, transferred the technicians to other operations and donated a large sum of money to create new industries which might support the population. It is considered doubtful if Sado will ever reopen. It has probably been visited by more geologists and mining experts than any other mine in the Orient but they all can't raise the ore grade above the 2.0 gram cost.

WORLDWIDE PROFESSIONAL DIRECTORY

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Cross section at left shows how KLEEN-SLOT Screens operate on a non-clogging principle.

Wedge Wire KLEEN-SLOT screen guards can be furnished in special sizes to your requirements in practically any type of long wearing metal. They are made to close tolerances like all Wedge Wire products—the width of each wire is held to plus or minus .002 to insure uniform opening width. All Wedge Wire features are embodied in these screen guards and it is to your advantage to consider them from the standpoint that they are non-clogging, non-blinding, strong, rigid uniform and more economical in the long run.

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There were three more too.

All were properly welded as this one will be also, then the crushing surface was rebuilt to standard size with MANGA-TONE N.M. and a final pass of RESISTO-LOY electrodes was applied over the bottom 20 inches.

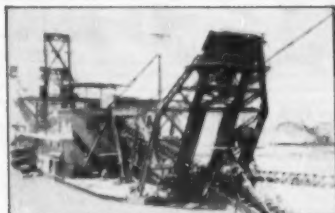
This liner then went back into service and has operated daily for almost two years.

Call in our field man for your problems—he is a specialist in this work.

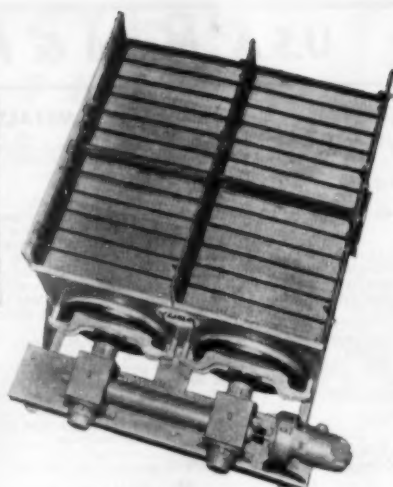


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Grand Rapids 7, Michigan



M-8 jig developed by YUBA for concentrating ores on dredges and in mills. It's designed to save space, reduce downtime, increase production.



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YUBA jig action is positive. You set the speed and stroke wanted, get constant, even pulsations that create surface action over full area of bed. Result: YUBA M-8 jigs have a large material capacity per flow line under full control.

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Stainless steel hutch valves and screens prevent rusting and clogging. Rubber seal between screen grids and basket minimizes abrasion and corrosion. Long-wearing hutch diaphragms of reinforced synthetic rubber can be replaced easily.

"Package Drive" units for YUBA jigs are interchangeable, completely enclosed, self-lubricating. Generous use of anti-friction bearings reduces power required. Maximum frequency of a 4-cell M-8 jig is 350 at 1/4". Stroke adjustments between 1/4" minimum and 3" maximum are easily and quickly made, enabling you to closely control jig action.

YUBA jigs can be installed in new or old dredges or mills to supplement existing jigs or to replace other concentration methods. Send us data on ore, feed sizes and present installation if you wish us to furnish details to adapt YUBA jigs to your operation.

71



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INTERNATIONAL

old workings and preparing of the mine for production will be accelerated after the power plant is commissioned. Much of the mining and surface equipment has been delivered, and production of flotation concentrates, it is hoped, will be started before the end of the year. Messina has also acquired options over 2,190 base metal claims in the Belingwe district in which an iron ore deposit with very favorable surface indications occurs. The deposit is in the Bukwe Mountains near the new rail-line being constructed between Bannockburn and Lourenco Marques. Diamond drilling is in progress. A drilling program is also under way in the company's exclusive prospecting reservation of 200 square miles in the Nuanetsi district, again near the above rail-line.

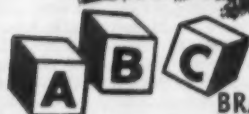
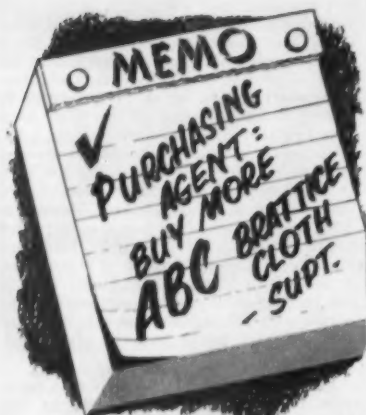
FRENCH WEST AFRICA—Operations are in their second year at the *Akjoujt* copper deposit of *Societe des Mines du Cuivre de Mauritanie*. It is reported that 600,000 tons of copper is contained in the ore assaying 1.5 percent Cu. The ore may be transported by desert track to a wharf which would be constructed at Tanit, on the Mauritanian coast. (See *MINING WORLD*, January 1953, page 59, for the full details on the formation of the company.)

UNION OF SOUTH AFRICA—The first Orange Free State mine to enter the phase of gold production in 1954 is the *President Steyn* mine of the *Anglo American* group, with first gold poured in April. Metallurgical test runs were started in 1952. At the end of 1953 the reduction plant was extended from 50,000 tons monthly to a capacity of 75,000 tons monthly. Satisfactory progress is being made in the erection of the uranium plant.

UNION OF SOUTH AFRICA—Discussions are underway by the *Freddies North Lease Area, Ltd.*, *Freddies South Lease Area, Ltd.*, *Johannesburg Consolidated Investment Group*, the *Anglo American Corporation of South Africa*, *De Beers Investment Trust*, and *Anglo Transvaal Consolidated Investment* with regard to amalgamating the two *Freddies* mines. Gold production at both properties started in July of last year, but because of the comparatively limited mill tonnages (approximately 25,000 tons per month each) and the inclusion of development expenditure as a charge against current revenue, losses of £50,000 and more monthly have been incurred. Both companies are reported to be heavily over-capitalized.

NIGERIA—Tin production from Nigeria during the last fiscal year was as follows: *Amalgamated Tin* 4,710 long tons; *Bisichi Tin* 538 long tons; *Gold & Base Metal* 552; *Jantar Nigeria* 212; *Naraguta Extended* 81; *Naraguta Tin* 237; *United Tin Areas* 130. Total was 6,460 long tons. Columbite production for the last fiscal year, and a comparison with estimated columbite production during the current fiscal year, follows:

Company	Production Last Fiscal Year short tons	Estimated Current Fiscal Year short tons
Amalgamated Tin	576	925
Bisichi Tin	209	210
Gold & Base Metal	93	130
Jantar Nigeria	210	210
Naraguta Tin	68	70
United Tin Areas	10	2
Total	1,172	1,547



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U.S.A. Metal & Mineral Prices

METALS

May 18, 1954

COPPER:	Electrolytic, Delivered F.o.b. cars, Valley basis	30.00¢
	Lake, Delivered, destinations, U.S.A.	30.00¢
	Foreign Copper, Valley basis	29.75-30.00¢
LEAD:	Common Grade, New York	14.00¢
	Tri-State Concentrates, lig, flotation 80% lead, per ton, Eagle-Picher	\$169.85
ZINC:	Prime Western; F.o.b., E. St. Louis	10.25¢
	Prime Western; Delivered, New York	10.75¢
	Tri-State Concentrates, 60% zinc, per ton Eagle Picher	\$64.00
	Primary 30 Pound Ingots (99% plus), F.o.b. shipping points	21.50¢
	Lone Star Brand, F.o.b. Laredo, in bulk	29.00¢
	(in ton lots) price per pound	\$2.25
	Sticks and bars, 1 to 5 ton lots (Price per pound)	\$1.70
	97-99%, keg of 550 pounds (Price per pound)	\$2.60
	Powder	Nom., per pound
ALUMINUM:	Ingots (99.8%), F.o.b. Freeport, Texas	\$247.00-\$255.00
ANTIMONY:	Flecks, small lots, New York	27.00¢
BISMUTH:	"B" Ingots (5 pounds), F.o.b. refinery, Port Colbourne, Ontario	60.00¢
CADMIUM:	Grade A Brands, New York (Price per pound)	95.75¢
COBALT:	99.3% + (Price per pound)	\$4.72
COLUMBIUM:	United States Treasury price	\$35.00 per ounce
MAGNESIUM:	Newly mined domestic, United States Treasury price	90 1/2¢ per ounce
MERCURY:	Foreign Handy & Harman	\$5.25¢ per ounce
NICKEL:	Per Ounce	\$84.00-\$87.00
TIN:	Powder, 100 pound lots, per pound	\$7.00
GOLD:		
SILVER:		
PLATINUM:		
ZIRCONIUM:		

ORES AND CONCENTRATES

BERYLLIUM ORE:	10 to 12% BeO, F.o.b. mine, Colorado	\$47.00 per unit
	Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H.	
	Visual inspection at \$400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, \$40 per unit; 9.0 to 9.9%, \$45; over 10.0%, \$50.	
CHROME ORE:	F.o.b. railroad cars eastern seaports. Long tons dry weight.	
	African (Rhodesian), 48% Cr ₂ O ₃ 3 to 1 Ratio	\$44.00-\$46.00
	African (Transvaal), 48% Cr ₂ O ₃ No Ratio	\$31.00-\$32.00
	Turkish, 48% Cr ₂ O ₃ 3 to 1 chrome-iron ratio	\$49.00-\$50.00
	U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, \$115.00; fines and concentrates \$110.00 for 48% Cr ₂ O ₃ and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr ₂ O ₃ .	
COLUMBIUM-TANTALUM ORE:	At United States small lot beryl purchase depots, \$3.40 per pound contained combined pentoxides in 50% ore, includes 100% bonus.	
IRON ORE:	Lake Superior, Per gross ton Lower Lake Ports	
	Mesabi, Non Bessemer, \$1.5% Fe, Second quarter	\$9.90
	Mesabi, Bessemer, \$1.5% Fe, Second quarter	\$10.05
	Old Range Non Bessemer, Second quarter	\$10.15
	Old Range Bessemer, Second quarter	\$10.30
	Swedish, Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit	\$22.00
	Metallurgical grade, 46 to 48% Mn, Long ton unit	\$1.05-\$1.07
MANGANESE ORE:	Chemical grade, 80% MnO ₂ , Per ton	\$70.00
	Domestic U. S. Government ore purchasing depots: Deming, New Mexico; base price \$2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of \$8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base price of \$4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of \$6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) \$2.30 per unit with premiums and penalties.	
MOLYBDENUM CONCENTRATE:	90% MoS ₂ , F.o.b. Climax, Colorado, Per pound of contained molybdenum, plus cost of containers	\$1.00
TUNGSTEN CONCENTRATE:	Domestic, 60% WO ₃ Per short ton unit	\$63.00-\$65.00
	Foreign, 65% WO ₃ Per short ton unit (Scheelite)	\$29.00-\$30.00
URANIUM ORE:	Foreign, South American, Spanish, Portuguese	\$27.00-\$28.00
	Carnotite-Roscoelite, F.o.b. purchase depot plus \$0.06 per ton mile (\$6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado, Salt Lake City, Marysville, Thompsons, Moab, and Monticello, Utah, Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is \$1.50 per pound and up to \$3.50 per pound of contained U ₃ O ₈ plus \$0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of \$0.25 per pound for each in excess of 10 pounds. A \$0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 0% lime are penalized for excess lime.	
VANADIUM ORE:	Carnotite-Roscoelite, V ₂ O ₅ in ratio of more than 10 parts to 1 part of U ₃ O ₈ are generally acceptable at all AEC depots, but excess not paid for at Marysville, Monticello and Shiprock.	Per Pound V ₂ O ₅ , \$0.31

NON-METALLIC MINERALS

BENTONITE:	Minus-200-mesh, F.o.b. Wyoming points. Per ton in carload lots	\$12.50
	Oil Well grade, Packed in 100 pound paper bags	\$14.00
FLUORSPAR:	Metallurgical grade, 70% effective CaF ₂ content per short ton F.o.b.	
	Illinois-Kentucky mines	\$42.50
	Mexican, 70% f.o.b. border	\$30.00
	European, Atlantic Ports, 70%	\$37.00
	Acid Grade, 97% CaF ₂ , F.o.b. Kentucky, Illinois, Colorado	\$60.00
PERLITE:	Crude: F.o.b. mine per short ton	\$3.00 to \$5.00
SULPHUR:	Plaster grades, Crushed and sized, F.o.b. plants	\$7.00 to \$9.00
	Long ton, F.o.b. Hoskins Mound, Texas	\$25.50
	Export	\$30.50

LONDON METAL AND MINERAL PRICES

May 18, 1954

		Per Long Ton USA	Equivalent cents per pound ¹
COPPER	Electrolytic, spot	£252 0s 0d	30.25¢
LEAD	Refined, 99.97%	£94 12s 6d	11.83¢
ZINC	Virgin, 98%	£79 7s 6d	9.92¢
ALUMINUM	Ingot, 99.5%	£156 0s 0d	19.50¢
ANTIMONY	Regulus, 99.6%	£210 6s 0d	26.25¢
TIN	Standard, 99.75%	£724 0s 0d	90.50¢
TUNGSTEN	Long ton unit, 195 equivalent to		\$27.30

1. With Sterling pound at \$2.80.

Quotations on metals and certain ores through the courtesy of American Metal Market, New York, N.Y.

[World Mining Section—62]

MINING WORLD

PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.



Denver-Davis Pulverizer Has Three Grind Ranges

The Denver-Davis laboratory sample pulverizer, announced by Denver Equipment Co., will produce samples to pass 80-mesh, 100-mesh, or 200-mesh by a simple adjustment. The unit is easily cleaned and is dust-free.

The pulverizer consists of a vertical assembly with horizontal grinding plates. It weighs 55 lbs. and is of rigid construction. The base is drilled for 3/4-inch bolts or lag screws and can be mounted quickly and easily on table or bench. The 1/2 hp. totally enclosed motor furnishes power for normal 900 rpm. pulverizer speed. Bulletin, No. LPI-B will give you more information. Circle No. 69.

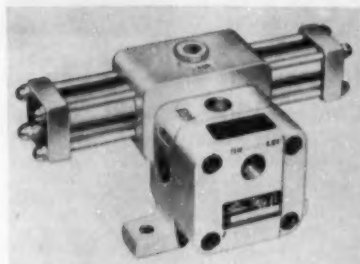


Electronic Metal Detector Has Ultra High Sensitivity

Dings Electronics, Inc., (subsidiary of Dings Magnetic Separator Co.) has announced a new Electronic Metal Detector, built for mining industry service, where extremely deep burdens are often encountered.

The metal detector, embodying "ultra high sensitivity," is sensitive to all metals, ferrous or non ferrous. It is said to detect even minute metal particles, signaling their presence, and thereby protecting machinery against tramp metal damage.

A wide range of signal and reject arrangements is available for use with the Dings Electronic Detector, to provide automatic detection with manual semi-automatic or fully-automatic rejection of tramp metal. Bulletin B-1920-A describes the Metal Detector in detail. Circle No. 72 for your copy.

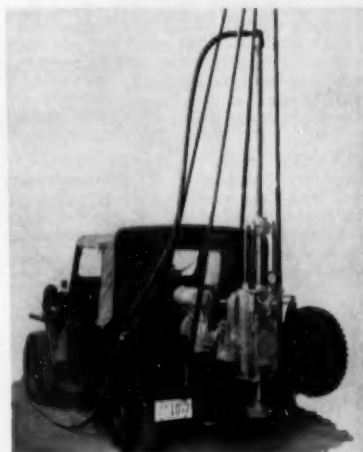


Disc-Type Power Operated Valves by Ledeen Mfg. Co.

Designed for actuating remotely located or automatically operated cylinders are two new disc-type power-operated valves by Ledeen Manufacturing Company, Los Angeles, California. Fast cycling, few moving parts, and minimum maintenance are just a few of the many outstanding features of these valves. Ledeen Valves are illustrated and described in Bulletin 1010; for your copy circle No. 62.

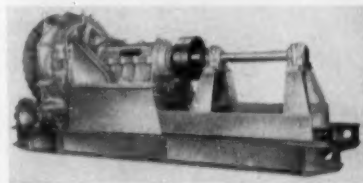
New Sintering Mach. Div. Aids in Ore Beneficiation

Sintering Machinery Corporation, Netcong, New Jersey, announces the formation of a new division to devote its efforts to the design, construction, and sale of ore beneficiation plants and related process equipment. Operating under Dwight-Lloyd, Inc., the new company takes its name from the inventors of the sintering process who also founded Sintering Machinery Corporation. The current research program of Dwight-Lloyd has resulted in the development of new equipment and processes for the economical treatment of taconite and other low-grade ores. The officers of the new company include H. E. Rowen, vice president, well-known in the industry and holder of numerous United States and foreign patents relating to mineral beneficiation equipment.



E. J. Longyear Company Presents The "Prospector"

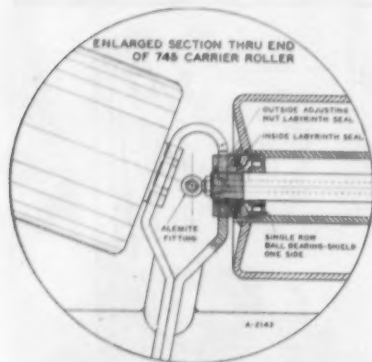
The E. J. Longyear Company has announced the addition of a new mobile unit to their line of diamond core drills. The jeep-mounted "Prospector" core drill is designed for quick and easy transportation from hole to hole, location to location, whether on or off the roads. The "Prospector" is also available on a two-wheel trailer mounting. This mobile, three-speed drill is ideally suited for mineral exploration in rugged country. The unit is equipped with a light-weight aluminum mast, and offers a choice of screw feed or hydraulic swivel head, for use with "E" or "A" drill rods. To find out more about the "Prospector" put a ring around No. 60.



Morris Pump Combines Advantages of Old Models

A new Morris dredge pump is now being made in two size ranges. The GA and GAF combines the lower speeds and outstanding reliability of the former F, with modern hydraulic design, high heads and efficiency of the former G. The GA and GAF reputedly offer the most-wanted features in a dredge pump. These include lowest cost per ton moved, durability, reliability, simplicity, minimum horse-

power, easy maintenance, thicker sections at points of great wear, good vacuum performance, and a choice of various alloys. Because pumps are the heart and foundation of the investment required for any dredging or hydraulic conveying system it will pay you to find out more about the GA and CAF. Circle No. 65.



Low Cost Belt Conveyor Carrier Designed by S-A

A new low cost belt conveyor carrier, SP-475, has been designed by Stephens-Adamson Manufacturing Company. This carrier incorporates a number of design features typical of more expensive units. The SP-475 is available in sizes for 18-, 24-, 30-, and 36-inch belts. You will want to know more about it, so circle No. 71.

New Railroad Car Catalog Offered by The Gregg Co.

A new catalog illustrating some of the many types of recently-built Gregg railroad cars is now available. The Gregg Company, Ltd. has world-wide experience in its more than 50 years of designing and building all types of railroad cars. Whether you are in the market for railroad cars now, or later, you will want this valuable catalog for your files. Circle No. 66.



Shaker Conveyor Handles Hot or Abrasive Material

Conveying operations involving hot or abrasive materials, as well as a wide variety of other materials, are easily handled by the full line of shaker conveyors available from Goodman Manufacturing Co. These conveyors move materials hori-

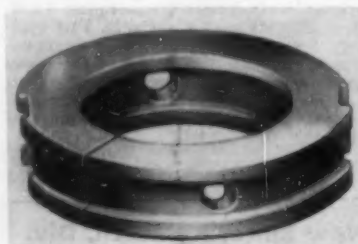
zontally, upgrade or downgrade for distances up to 500 feet.

Powered by 10-, 15-, or 20-horsepower electric motors or 10- or 25-horsepower air motors, the shaker conveyors can be supplied with trough sections ranging from 12- to 36-inch widths, 6- to 16-foot lengths, and 6- to 18-inch depths. Angle sections are available for operations in which the trough line turns. Circle No. 68.



How to Cut Your Timbering Costs—High Speed Jack

A new high-speed mine timber jack has been developed for safer, more economical mine timbering by Templeton, Kenly and Company, Broadview, Illinois. Faster operation over that of screw jacks is credited to a crank and bevel-gear arrangement which rotates the screw. With a capacity of six tons, the jack is available in five models with a minimum height of 3½ feet and a maximum height of 9½ feet. A variety of heads are available to accommodate all types of timbers. For more information circle No. 61.



Flexible Teflon Seal Cage Easily Snapped Over Shaft

The one-piece flexible Teflon Seal Cage, developed by Chemical & Power Products, Inc., can be easily snapped over the shaft without dismantling the pump or pulling the shaft. Designed for use with stuffing boxes on pumps, mixers, reactors and other types of processing equipment, these seal cages overcome the handicaps experienced with two-piece metal lantern rings.

Unlike the metal lantern rings the Teflon seal cages will not score the shaft during operation, even at high speeds. They will last considerably longer than the metal rings and will not bend or collapse under extreme gland pressure. Circle No. 70.

Notes From The Manufacturers

HARMON S. EBERHARD, executive vice president of Caterpillar Tractor Company, San Leandro, California, was elected president of the firm, succeeding **LOUIS B. NEUMILLER**, who became chairman of the board of directors. Mr. Eberhard began his career with Caterpillar as a draftsman in 1916. In later years he became chief engineer, vice president in charge of engineering, manufacturing, and research, a member of the board of directors, and executive vice president.



Formation of a new Allis-Chalmers Manufacturing Company subsidiary, Allis-Chalmers, Great Britain, Ltd., has been announced by the parent firm. Managing director will be **E. J. Mercer**, general manager of the tractor division's English branch at Totton, Southampton since 1951. The subsidiary will handle all Allis-Chalmers operations in the British Isles and in export markets served from the United Kingdom.

New manager of the Latin-American Section of Mine Safety Appliances Company's International Division is **Arch S. Abbey**. In his new post Mr. Abbey will supervise sales of mining and industrial safety equipment throughout Latin America. The section has been established to accommodate managements of mines and industrial plants in Central and South America, who are placing increased emphasis on safety in their operations.

William C. Messinger will replace **George D. Gilbert** as secretary of the Chain Belt Company of Milwaukee, Wisconsin. Mr. Messinger has been assistant secretary and manager of the company's Ordnance Division. Mr. Gilbert, who was a director of the company, is resigning after 35 years with the organization. Since 1942 he had been secretary and general manager of the Baldwin-Duckworth Division. **Edward M. Rhodes** succeeds Mr. Gilbert as manager of the Baldwin-Duckworth Division and **Roland V. Polsson** will be sales manager for the Baldwin-Duckworth Division.

J. D. Burgess heads the Sierra Machinery Company, Inc. in Reno, Nevada, which has just received the appointment as distributor in Nevada for General Motors Corporation's Euclid Division. Mr. Burgess has been active in the construction equipment field for many years. His new contract covers most of Nevada and parts of California. Euclid's district representative in the area is **H. P. Behl**.

Carl E. Hanson, sales manager, and **W. Eckley**, chief engineer, have moved their headquarters from Minneapolis to Chicago with the purchase of the Diamond Iron Works by the Goodman Manufacturing Company. The Diamond Division has been transferred to Goodman's main plant in Chicago. Mr. Hanson and Mr. Eckley will continue to supervise sales, engineering, and service for the Diamond group.

DEEP BURDEN METAL DETECTOR: The Dings Electronic Metal Detector will detect the presence of any metal, ferrous or non-ferrous, under extremely deep burdens. Single turn coil construction simplifies alignment. The coil completely surrounds the conveyor belt and metal at any depth in the burden can be detected. Circle No. 5.

ROTOCURED BELTING: A 29-page catalog covering the Boston line of roto-cured transmission, conveyor, and elevator belting has been released by the Boston Woven Hose & Rubber Co. Each belting product is pictured in color and tabulated as to its specifications, type of construction, and recommended use. A section is also devoted to the formulae and rules used in estimating horsepower requirements for Boston belting. Circle No. 24.

pH CONTROL REVIEWED: An informative report on the role of automatic pH (acidity) control in industry—to help executives, process engineers, and chemists better understand this important technique—is available from Beckman Instruments, Inc. The 12-page brochure gives a picture of continuous pH recording and control in three major processing areas. Simplified diagrams and sketches describe typical pH installations for a variety of processes, with emphasis on improved product quality, better process efficiency, and lower material and maintenance costs. Circle No. 26.

"SUPERIOR" GYRATORY CRUSHERS: Engineering features of "Superior" primary and secondary gyratory crushers are described in a bulletin by Allis-Chalmers Mfg. Co. The bulletin tells how the crushers' flexibility permits meeting a broad range of operating conditions. It points to their sturdy all-steel construction, heavy external ribs, and large head diameter. Included in the bulletin is a performance table, a selection of product curve, a formula for determining horsepower requirements, and dimension tables for primary and secondary gyratory crushers. Circle No. 28.

TWO-STAGE CENTRIFUGAL PUMPS: Worthington Corp. offers a bulletin on type UNB two-stage centrifugal pumps designed for working pressures up to 490 psi. and capacities up to 1,300 gpm. The pumps are available in bronze, iron, and stainless steel fittings with cast iron, bronze, steel and stainless steel castings and are readily adaptable to refinery,

mine, and other services. Circle No. 30 for bulletin W-318-S27.

CARBIDE-TIPPED ROOF BOLTING BIT: A cemented carbide-tipped prong-type roof bolting bit for drilling starter holes in ore and chemical mines has been developed by Carboly Department of General Electric Co. Designated the APT-24, the new drill bit was designed for fast, straight hole-cutting in shale and strata softer than sandstone. It also may be used to cut 1½-inch expansion anchor holes. The bit has a standard ½-inch square shank of heat-treated alloy steel. Circle No. 31.

ELIMINATE HAND SPLICING: Huge savings in time are made possible by a new wire rope pressing system that eliminates hand splicing. Using the new system, a worker can make as many as 20 or 30 splices in an hour, as compared to 6 or 7 conventional splices per hour for a skilled worker using hand methods. The pressing system, announced by Jones & Laughlin Steel Corp., employs an aluminum alloy clamp or sleeve that is squeezed around the wire rope in a special hydraulic press. Called Jalklump, the device is used as a mechanical method of splicing eyes, with or without thimbles, in the ends of wire rope. This "splice" gives 100% of the breaking strength of the wire rope itself. Circle No. 32.

NEW TYPE BLASTING MACHINE: What is believed to be the first condenser discharge type blasting machine utilizing a high voltage DC generator directly connected to charge the condensers has been developed by Fidelity Instrument Corp. with the co-operation of engineers of Atlas Powder Co. The new machine is completely self-contained and always ready for use. A specially wound, permanent magnet DC generator is hand-cranked through a train of gears which permits cranking speeds to remain moderate. To prevent firing before the condenser is fully charged, an accurate relay is wired into the firing circuit. For more information on this new blasting machine, circle No. 36.

FIELD MANUAL FOR HARD SURFACING: The Victor Equipment Co. hard-surfacing manual gives complete information as to type of alloy to use, preparation, welding, and finishing procedures for hard-surfacing equipment parts. The loose-leaf manual is printed on heavy stock with protective cover folder

to withstand field use. Circle No. 37 for your copy.

MULTI-STAGE IMPACT BREAKER: The Cuber Senior Model 3648 is a dual rotor, up-running breaker featuring a multi-stage, triple action reduction principle—an entirely new concept in impact breaking. Material flow is regulated by a low positioned-feed device that provides a minimum feed height for maximum rock penetration and the elimination of "foul balls." The Cuber Senior, made by Kennedy-Van Saun Mfg. and Eng. Corp., is designed for primary and secondary breaking of non-abrasive stone and like material in a single unit. Bulletin D-3648 is fully illustrated and lists all the specifications. Circle No. 4.

RUGGED MINE CARS: The Gregg Co., Ltd., has a new beautifully illustrated catalog showing some of its mine cars recently built for mines in various countries. If you use, or are planning car haulage in your mine this catalog is a must; and it's yours for the asking. Circle No. 1.

NEED BETTER DENSITY CONTROL? A Denal-O-Meter developed and manufactured by the Sierra Industrial Instrument Company of San Francisco, California, will measure and record density to the third decimal place. No sampling is required as the measuring unit is bolted into the production line, measuring any density range. The Denal-O-Meter will measure the density of pulp slurries, solutions, or fluids. To learn of the wide field of application of this meter and how it can help you circle No. 2.

KILNS, COOLERS, DRYERS: The Traylor Co. has a new bulletin available on their rotary kilns, coolers, and dryers. The 36-page bulletin tells of the constructional features and applications of this equipment. Those requiring a knowledge of the above won't want to miss this one, so circle No. 3.

A GOOD RECONDITIONING JOB is the title of a two-color booklet just put out by Caterpillar Tractor Co., showing why genuine Cat parts are designed to give old machines new machine performance. The eight-page booklet tells how Cat parts are better—how they reflect important late design improvements to give extra long service. Cat pistons and rings, cylinder liners, precision bearings and valves are pictured, and their outstanding

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features pointed out. Everyone owning a Cat will want this booklet. Circle No. 6.

GAR WOOD STRONG-ARM HOISTS: A new line of standard duty, arm-type hoists, trade-named "Strong-Arm" and a line of matching dump bodies have been announced by Gar Wood Industries, Inc., Wayne Div. Gar Wood Strong-Arm hoists offer greater value at no extra cost over previous models because new design provides 14 percent more lifting capacity, longer hoist life because of better engineered construction, and easy maintenance without special tools or hydraulic specialists. These are only a few of the many advantages of the Strong-Arm line. For full information circle No. 22.

GALANOT TIRE-TRACKS will keep your pneumatic tired equipment mobile in all types of terrain conditions. The traction and flotation device comparable to a crawler mount, enables rubber-tired equipment to operate in mud, snow, or sand, when those conditions would ordinarily force them to stand idle. Designed to fit a range of tire sizes from 6:00-15 to 18:00-26 and handling loads up to 60,000 lbs., the Tire-Track is proving to be of immense value. Learn more about this money saving piece of machinery by circling No. 8.

RUBBER HOSE AND BELTING: The Carlyle Rubber Co. has a new 24 page catalog which gives complete specifications and prices on many types of rubber hose, power and conveyor belting. The information contained in this catalog will be of great value in purchasing the above supplies. For your copy circle No. 9.

M.S.A.-JONES VISOR GOGGLES provide the right combination of protection from industrial eye hazards: protection from flying particles and splashes, and protection from glare. The visor goggle assembly consists of an opaque green visor which cuts out overhead glare, an impact-resistant, readily replaceable plastic lens, and a headband. It fits all head sizes comfortably and does not interfere with the wearing of glasses. Another advantage of the new Mine Safety Appliances Company goggle is that four readily interchangeable lenses are available to meet varying light requirements. These lenses are of special shape which permits them to hug facial contours without discomfort encouraging voluntary full-time wear. Circle No. 10 for more information.

DEVELOPMENTS IN V-BELT DRIVES: "Making the Most Out of New Develop-

ments in V-Belt Drives," is the title of a bulletin prepared by The American Pulley Co. This bulletin tells of the principal approaches used by engineering organizations in procuring V-belt drives, and the correct way they should be selected for the best possible service. It also tells of the latest developments in the construction of V-belts and the many advantages gained by using SUPER-SERVICE Wedgebelt drives. To get your valuable copy circle No. 11.

POLY-V DRIVE: is Raybestos-Manhattan's new concept of power transmission. The Poly-V Drive has been under active development for five years. The research was motivated by a desire to provide an ideal drive, one that would combine the simplicity and strength of flat belts and the speed and grip of V-Belts. Users said they wanted a solution to the matching problems, reduced belt and sheave inventory with greater interchangeability, and longer life for belts and sheaves. Raybestos-Manhattan's answer is the POLY-V DRIVE. For full information circle No. 12.

HOW TO SELECT A MOTORPUMP: is the title of an interesting and informative booklet compiled by Ingersoll-Rand Co. The booklet gives a brief description of what a centrifugal pump is and how it works. Then it points out the various factors, such as the quantity, pressure, friction losses and head that must be considered in selecting a pump to meet a specific installation. The next step is the presentation of a typical problem and its solution, by means of material shown on previous pages, such as charts and curves. Finally the booklet states the material recommended for various pumping installations and gives actual installation views. Circle No. 13 for your copy.

ROCK BOLTING APPLICATIONS: A very informative booklet on the subject of rock bolting procedures and techniques has been prepared by Ingersoll-Rand Co. It is intended as a general guide for rock bolting techniques, and describes briefly a complete line of equipment manufactured for this application. The booklet deals with the theory of rock bolting and by means of simple, clear illustrations explains how rock bolting works. The article also outlines the advantages and disadvantages of the procedure. All mine operators should find the sections on the procedure, types of bolts, size of holes and making of bearing plate, informative

and of practical use. Other sections take up torquing the nuts, types of drills used and size of impact wrenches recommended for rock bolting jobs. Any one using or considering using the rock bolting procedure will want this booklet. Circle No. 14.

"TEXROPE" V-BELT DRIVE: A six-page bulletin which provides in condensed form the necessary information on the new method of calculating the horsepower capacity of a "Texrope" V-belt drive has been released by Allis-Chalmers Mfg. Co. The belt ratings resulting from this new method take into consideration effect of belt length, ratio of the diameters of both the driving and driven sheaves upon the horsepower rating of the belt, and resultant belt life. These are features which were not adequately reflected in the former V-belt horsepower ratings. For your copy circle No. 21.

BRAKING DOWNHILL CONVEYORS: Two conveyor engineers of Hewitt-Robins, Inc., have perfected a method of braking the descent of downhill conveyors by the use of an automatic clutch mechanism which prevents the belt from running downgrade beyond its designed speed. The mechanism utilizes a single motor attached to a drive pulley and a holdback pulley, each equipped with a one-way clutch. When power is required to drive the conveyor uphill or over level ground, the drive pulley is automatically engaged and the holdback pulley remains free wheeling. When the conveyor starts downhill, the hold back pulley takes over from the drive pulley and regulates the belt's descent. This control relieves strain on the conveyor system and permits the use of lighter, more economical belts than would be permissible with the conventional type of drive. For more information about this new mechanism circle No. 15.

HEAVY DUTY FORK TRUCK: Designed to meet industrial needs for a heavy duty pneumatic-tired fork truck, the Clark-Ross Y-200, is now available in the regular line of fork trucks manufactured by Clark Equipment Co. The Y-200 was designed and constructed specifically for heavy-duty applications. The machine is hydraulically controlled throughout, including lift, tilt, power steering and power braking, and all main hydraulic units are in a separate compartment directly accessible through hinged panels. For complete information circle No. 25.

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IDAHO

On May 1, 1954, the old Rainbow No. 2 adit in Shields Gulch south of Osburn, Idaho in the silver belt had been extended approximately 2,358 feet from the old face near the southern boundary of the Rainbow group of claims. This level on that date had a total length of 5,352 feet. Cross-cutting was started last year by Day Mines, Inc. following rehabilitation and enlargement of the 3,000-foot adit driven many years ago by Rainbow Mining and Milling Company. Coeur d'Alene Mines Corporation, which controls Rainbow, granted Day Mines, Inc. an easement which permits the extension of the crosscut through the Triangle group owned by Day and American Smelting and Refining Company, across the property of the Sterling Mining Company, which is held by a lease to DMI-ASARCO, and on into the west Fern group, controlled by the same two companies. In April progress was doubled by adding a second shift.

Encouraging results under a \$31,650 DMEA exploration project at the Champion lead-zinc mine near Mackay, Custer County, Idaho justified a \$8,000 extension of the government-aid contract for 200 feet of additional drifting along the vein. Ivan Taylor and John Pritchett are operating the property under lease from Joe Ausich of Mackay.

Three truck shipments of lead and zinc concentrates are being made monthly from the Clark Fork, Bonner County, Idaho property of Hope Silver-Lead Mines, Inc., to Bunker Hill's Kellogg smelter. Ore is coming from a new tunnel 400 feet above an old adit. About a dozen men are employed. Glenn C. Lee, Kennewick, Washington, newspaper publisher, is company president.

The Whitedelf Mining and Development Company is making truck shipments of lead-silver concentrates to the Kellogg, Idaho smelter. Shipments have been at a rate of 15 to 20 tons monthly and have been averaging \$200 a ton. Ore is mined from the north ore body on the new bottom 800-foot level. Development work is being done southerly from the shaft. Compton I. White Jr. of Clark Fork is president and manager.

The old 150-ton Galena mill in Lake Gulch west of Wallace, Shoshone County, Idaho has been purchased by American Smelting and Refining Company and consideration is being given to increasing its capacity. Purchase was from Zanetti Brothers of Wallace who purchased the mill years ago from Callahan Zinc-Lead Company. They have been milling development ore mined by ASARCO from the adjacent Vulcan-Galena mine. ASARCO has a long-term lease from Vulcan Silver-Lead Corporation, which is controlled by Callahan Zinc-Lead.

Argentine mining claim, west of Lake Gulch, one of the oldest claims in the Coeur d'Alene mining region's silver belt, has been purchased by Vulcan Silver-Lead Corporation for 10,000 shares of Vulcan stock. The claim juts into Vulcan's block of claims.

Clearwater Mines, Inc., Wallace, has offered 1,000,000 shares of common assessable stock for sale at 10 cents each

to finance additional work at its copper-silver-gold property on Niagara Creek in southeastern Shoshone County, Idaho. Plans include a 12-mile water level access road, improvement of camp facilities, and construction of a 50-ton mill as production warrants.

Boundary Silver and Lead Mines of Bayview, Kootenai County, Idaho has been incorporated for \$350,000 by Ulric Krehbiel, Lind, Washington; Francis Russell, Sunnyside, Washington; Alvin MacDonald, Bayview; Paul Pfrimmer, Coeur d'Alene, and Guy W. Patchen, Bonners Ferry.

Rescue Mining Company, recently organized at Warren, Idaho, has made a public offering of 1,200,000 shares of nonassessable common stock at the par value of 25 cents each to rehabilitate, reequip, and develop the old Rescue gold-silver mine in the Warren mining district, Idaho County. Proposed expenditures include \$15,000 for Diesel power unit and compressor for use underground and for a Diesel power unit for the mill. Mill capacity would be increased an additional 50 tons, mine cars, drilling machines and other equipment purchased, and assay office constructed and equipped. Abraham R. Sax of Boise is secretary-treasurer.

Engineering Company's mill at Glen which began operations last November. The mine is operated by Minerals Engineering under sublease from American Alloy Metals Company, headed by E. A. Julian, San Francisco, and Frank Eichelberger, Spokane. William Tobey is general superintendent; R. N. Roby, mine superintendent, and Earl Craig, mill superintendent.

The recent strike by the A. F. of L. carpenters union delayed construction of the Anaconda Aluminum Company's new plant near Kalispell, Montana, when work almost completely stopped.

Peter Antonioli is reported to have bought the old Granite and Bimetallic mines in Granite, Montana. Mr. Antonioli plans to repair the shaft and to install a hoist at the Bimetallic in an attempt to get underground to sample and mine the ore in the lower workings. These mines produced large amounts of rich silver ore in the late 1800's and early 1900's. In recent years, Granite has become a ghost town.

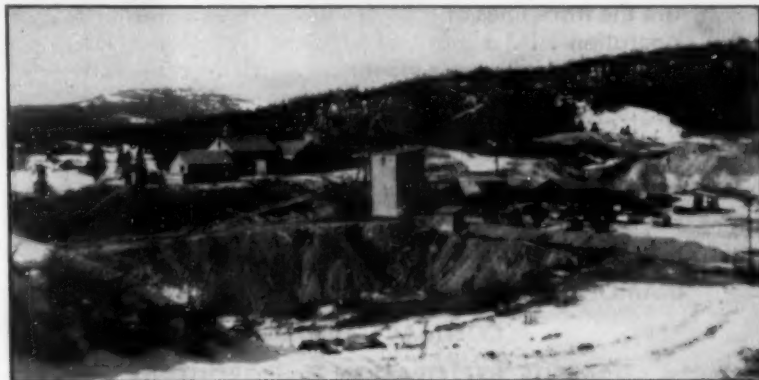
The old Isele property south of Butte, Montana has been taken over by the Butte Western Mining Company. The shaft has been dewatered to the 300 level and sampling is now being carried on in the open levels on two veins.

MONTANA

Operations at the Browns Lake open-pit tungsten mine, Beaverhead County, Montana, will be expanded this summer with stripping of about 1,000 tons of limestone overburden daily. Production will be increased to about 400 tons of ore daily. Three hundred and fifty tons now are being milled daily in the Minerals

OREGON

A 1,200-foot cut to a 65-foot depth is planned by Pine Creek Placers to test bedrock under Pine Creek, draining areas below the Cornucopia gold mine in Baker County, Oregon. Excavated gravels would be sluiced to determine if gold content merits working the entire creek bed. R. M. Conley is in charge.



Knob Hill Mines Under Lease Agreement with Day

Knob Hill Mines, Inc., Washington's leading gold-silver producer, is mining and milling medium-grade ore from the adjoining Aurum ground under a lease from Day Mines, Inc. of Wallace, Idaho. The properties are in the Republic district of Ferry County, Washington. Mining is from the 600-foot level of the Knob Hill mine. Sinking is underway to open a ninth level at a depth of 1,325 feet, and the work is expected to be completed about midsummer. Lateral development then will be undertaken. The view above is of the mine surface installations. From left to right are the office, hoist room, compressor house, water tanks, headframe, sand plant, quonset hut for change house, and timber shed. The sand pump is in the foreground. The present arrangement with Day Mines is a resumption of a similar arrangement that existed about 10 years ago when Knob Hill Mines mined and milled a substantial tonnage of ore for Aurum Mining Company before it was completely absorbed into Day Mines. A. R. Patterson is general superintendent of Knob Hill Mines.

Lucky Nine Chrome Company is constructing a concentrator two miles west of Canyonville in Douglas County, Oregon. Incorporators of the firm were H. R. Winston, Wayne Young, Daryl Cohl, Raymond Carson, Sealy Carson, Bernard Carson, Dorothy Kartes, Ed Collins and Hurley Wilson.

About 2½ miles northwest of Canyonville, Oregon, a concentrator has been completed on the north bank of the Umpqua River by Nick Meyer and Lester Shippen. Equipment includes a jaw crusher, ball mill, cone classifier and two concentrating tables. North of Canyonville, a recently completed concentrator is treating ore from several chrome properties. Capacity is now about two tons of

concentrate daily, and a larger concentrating table is being installed. The mill is owned by G. W. Fitzpatrick and J. E. Fitzpatrick.

Near Baker, Oregon, another chrome processing mill is reported to be under construction by the *Grant County Chrome Corporation*. Articles of incorporation for the new company were filed by Fred J. Young, Blanche Behner, and Margaret Hoskins, all of Baker; owners of the firm are reported to be Endre Norme, of Hohokus, New Jersey, and Alwyn H. and Marion Wild of New York City.

A shaft at the *Roba & Westfall* quick-silver prospect on Murderers Creek, Grant County, Oregon has been deepened more than 50 feet and has pene-

trated the mineralized zone. The work is being done on a DMEA contract.

WASHINGTON

Northwest Magnesite Company of Chewelah, Stevens County, Washington, has resumed operations following a six-week shutdown because of steel production interruptions which piled up stocks of magnesite used in lining open-hearth steel furnaces. Three hundred men were on the payroll. Ball mill grinding facilities at the company's Finch quarry flotation mill have been doubled and automatic tramway concentrate loading provided. Howard A. Ziebell is general manager.

Western Ventures, Inc. has purchased the diatomaceous earth claims located in the Badger Pocket area, 17 miles southeast of Ellensburg, Washington. The claims were formerly owned by the *Kititas Diatomite Company*. Production has been started and the company is planning the installation of calcining equipment this spring. Reserves are estimated at 30,000,000 tons. The firm, which has been financed by American and Canadian interests, is managed by W. R. Green of Spokane.

Kenite Corporation of Scarsdale, New York has installed a two-stage drying system at its diatomaceous earth mine and processing plant at Quincy, Washington, in the Columbia Basin Reclamation Project, to cope with increased moisture. Moisture has greatly increased since irrigation water reached the area. The plant's dust collecting system has been improved and an enlarged storage bin with conveyor system is being built to eliminate open storage piles of raw material at the mill. Large stockpiles of diatomaceous earth are being built up at the quarries located about 18 miles south of Quincy. A power shovel has been added to supplement bulldozers and carryall now in use at the quarries. Production of Kenite filter aids and fillers varies from 1,000 to 1,600 tons per month. C. F. Koenig is resident manager.

The *Gold King* mine at Wenatchee, Washington, had gross production valued at \$832,000 in 1953, bringing to more than \$3,500,000 the value of gold removed since 1949. Discovered in 1885, the property was worked intermittently as a low-grade deposit until Edward H. Lovett, Canadian mining engineer, acquired it. He uses selective mining methods on the higher grade vein occurrences.

Contract Milling Company of Spokane, Washington has been organized by J. Stanley Huckaba, metallurgical engineer, and associates to provide ore milling service at mining properties on a contract basis. Intended primarily for a mine's development period, the service would provide the operator with some revenue while determining the economic feasibility of installing a larger, more permanent-type mill. It is estimated that a semi-fabricated plant with ball mill capacity of up to 125 tons or more per day could be set up in about 30 days. The mine owner's sole cash outlays would be for mill foundations and freight charges.

Worth looking into..

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Northern Florida Scene Of Titanium Activity

Kennecott Copper Corporation's wholly owned subsidiary, Bear Creek Mining Company, is conducting what it considers to be "routine" geological surveys and test drilling in Bradford, Clay, and Duval counties, Florida. Bear Creek has been granted approval to test for titanium and other heavy minerals on all of Bradford County's road rights of way by the county commissioners. This county is one of the nation's most important titanium oxide (ilmenite) producing counties in the United States.

The Humphreys Gold Corporation operates for the E. I. du Pont de Nemours and Company a 20,000-ton-per-day plant at Trail Ridge, near Starke. Du Pont has also started construction of its Highland plant near Lawley which is expected to have an annual output of 100,000 tons of titanium minerals.



An iron ore processing mill is being erected on Highway 63 north of Bransville, Missouri by the *Daniel Mining and Development Corporation*. The \$150,000 plant will have a capacity of 200,000 tons per year. Private financing is building the plant and F. B. Daniel of Orange, Virginia B. Thompson of South Carolina, and Bob Evans of West Plains, Missouri are reported to be the sole owners. Ore will be mined from various deposits in Howell and Oregon Counties.

Goodyear Tire and Rubber Company of Akron, Ohio reports that it is building the world's strongest belt conveyor for installation at a mining operation in northern Minnesota, firm name not disclosed. The belt is designed to operate at 120,000 pounds of working tension, and will haul low-grade iron ore 1,000 feet on a line while lifting it 250 feet. Maximum tonnage on the 60-inch wide steel cable belt will be 3,360 tons an hour. Eventual haulage will be 12,600,000 tons annually.

St. Joseph Lead Company has closed its Hayden Creek mill near Frankclay, Missouri after unsuccessful recovery of concentrate. The mine will continue to operate, with the ore crushed underground and transported by truck to the Leadwood mill for concentration. In Desloge and Esther, extensive diamond drilling has been going on; unofficial reports state that the prospects are showing good results. The Desloge drilling is on property which was formerly owned by *National Lead Company* but was purchased by St. Joe several years ago. The drilling there is in the vicinity of the old No. 3 National mine and so far has extended to Cantwell Lane. Prospecting in the Esther area is on ground which was formerly owned by *Columbia Lead Company*.

Hardin County, Illinois has been the scene of several recent fluorspar mine and mill shutdowns or production curtailments. After seven years of continuous operation, the *P.M.T. Mining Company* has closed that company's mine at Hicks Creek because it cannot sell its fluorspar. The *Rosiclare Lead and Fluorspar Min-*

ing Company has stopped most operations temporarily, also because of a lack of orders for fluorspar. Water will be kept pumped out of the mine and the grinding mill and flotation mill will be kept in operation. The *Minerco Oil Company's* mines and plants are now on a three-day week instead of five, which it is hoped will be only a temporary arrangement. The *Ozark-Mahoning Company* has laid off some men; discontinued work on the shaft on the *Oxford* property; and closed the *W. L. Davis No. 2* mine. *Ozark's* mill at *Rosiclare* was closed for two weeks while repairs were made. This automatically closed the mine, too. All storage space and bins were filled with fluorspar, but the company expected its regular orders to move out the finished fluorspar so that the mill could resume operations.



Republic Steel Corporation reopened its iron mines at Lyon Mountain, New York after being shut down for almost a month. An upturn in demand for steel was expected to make normal operations possible. No date was reported for reopening of the firm's other mines at Mineville in the Adirondack Mountains.

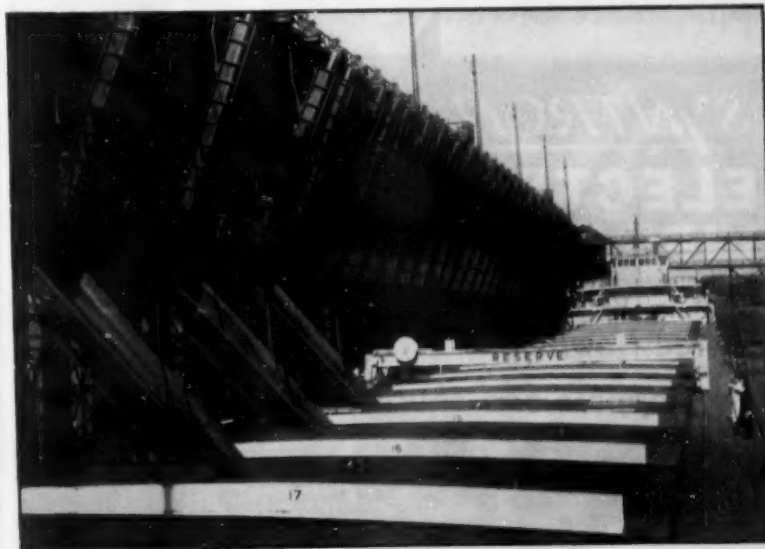
The Bureau of Land Management recently offered 70 acres of land in Unicoi

County, Tennessee for manganese leasing. The land was offered through sealed bids at a minimum bonus bid of \$1.00 an acre. Terms and conditions of any leases granted include: a lease period of 10 years; a royalty of 5 percent, and a minimum annual royalty of \$100; a rental of \$1.00 an acre payable in advance at the beginning of each lease year; production to start within 12 months after issuance of lease; and a bond of \$1,000.

The *United States Steel Corporation* opened its new ore-handling facility at Mobile, Alabama in time to receive 10,500 tons of iron ore from *Marcona Mining Company's* operations at San Juan Bay, Peru. The new terminal is operated by Tennessee Coal & Iron Division of U. S. Steel and has been under construction for two years. Special ore carrying freight cars transship the ore to steel mills in the Birmingham area.

The new Bonnie chemical plant of *International Minerals & Chemical Corporation* at Bartow, Florida will be closed for a few months while equipment modifications are made in the manufacture of triple superphosphate. The work should be completed by September at which time regular operations will be resumed. At the *Noralyn* mine where a new mine cut is being opened, a change in pump positions is underway. "Tillie the Toiler," the 650B dragline, has been moved to the *Achan* mine and the new "Super Scooper" will make the new mine cut.

A single block of mica weighing about 475 pounds before it was split and trimmed was recently produced at the *Deer Park* mine near Spruce Pine, North Carolina. The block was worth about

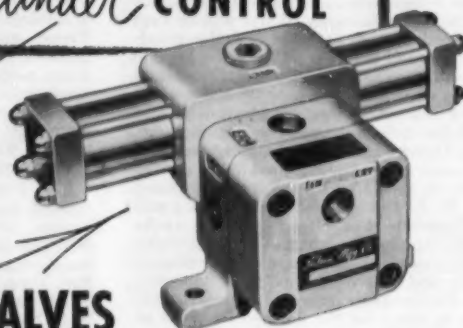


First Taconite Pellets Shipped By Reserve

While the 1954 ore shipping season on the Great Lakes is not expected to set any new records as far as tonnage is concerned, it will most certainly be remembered for another important first—shipment of the first full cargo of taconite pellets. The season opened on April 19, with the loading of almost 18,000 tons of taconite pellets by the steamer "Reserve" at Two Harbors, Minnesota. They were mined and processed by *Reserve Mining Company* at Babbitt, Minnesota during the winter and stockpiled. The shipment was unloaded at Toledo, Ohio and then transhipped by rail to blast furnaces of *Republic Steel Corporation* and *Armco Steel Corporation*, joint owners of *Reserve*. It is now official that *Reserve's* new post office address at its company town 55 miles from Duluth is Silver Bay, Minnesota. A post office with this name has been established and is now in operation.

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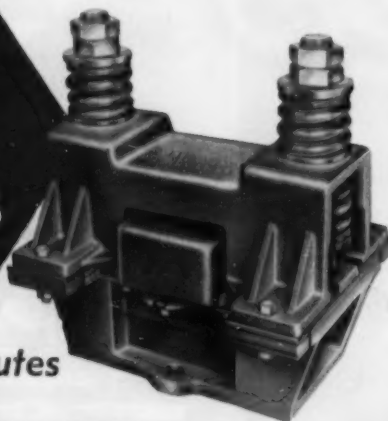
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\$600 at the U. S. Government Mica Buying Depot in Spruce Pine. Ben Blalock, R. E. Tippet, and Joe Blalock operate the mine. They reopened the famous old producer last year and have now completely dewatered it. The large block came from the 350-foot level, and plans are now to start production on the 425-foot level.

The Department of Agriculture announces that from January 28 until March 12 about \$10,800,000 worth of farm commodities had been exchanged for items used in foreign aid programs, for requirements of other government agencies, and for the national stockpile. Some of the strategic materials received are metallurgical chromite, mercury, and diamonds.

The price of platinum has been reduced by Baker & Company, Inc. of Newark, New Jersey, one of the world's leading refineries of precious metals. The new prices are \$84.00 per troy ounce for bulk quantities, and \$87.00 per troy ounce for retail lots. The price at Baker for the past three years had been from \$90 to \$93 per troy ounce. Platinum production has increased and a larger market has also been developing as new uses for the metal have been discovered.

Electro Metallurgical Company, a division of Union Carbide & Carbon Corporation, has started first commercial production of electrolytic chromium at its alloy plant at Marietta, Ohio. When the electrolytic units are in full operation, production will be about 2,000 tons per year. The process produces chromium of a higher content than any now commercially available.



Inland Steel Company has announced the permanent closing of the Cayla mine, near Crystal Falls, Michigan. The Cayla is a relatively new mine. The shaft was put down in 1951 and ore has been mined and stockpiled since that date. No shipments have been made to date. Inland has indicated that operating costs have become so high at this property that it can no longer be economically worked. W. P. Reed, superintendent will continue as superintendent of Inland's Bristol mine at Crystal Falls.

The Bennett mine near Keewatin, Minnesota is to be the site of a new beneficiation plant to be constructed by Pickands Mather & Co., agents for the Bennett Mining Company. The plant will consist of crushing, screening, washing, heavy media, and cyclone sections and is to be ready for production by the start of the 1955 ore shipping season. The new plant will replace an existing crushing, screening and washing plant.

The James mine near Iron River, Michigan, one of the largest iron ore producers on the Menominee Range, has been closed after 45 years of operation. The 52 miners employed at the mine have been transferred to the Buck mine at Caspian and Lawrence mine at Crystal Falls. Pickands Mather & Co. took over the James operation in 1925 from the Mineral Mining Company of Milwaukee.

MINING WORLD

Bear Creek Abandons Arizona Drilling Program

Kennecott Copper Corporation's exploration subsidiary, Bear Creek Mining Company, is reported to have stopped churn drilling east of the San Manuel Copper Company's porphyry copper ore body in Pinal County, Arizona.

In the area where Bear Creek was drilling no mineralized outcrops have been found. However, predication of favorable mineralization had been based on geological assumptions and, most importantly, on a map made by the United States Geological Survey which indicated an apparent magnetic anomaly somewhat similar to the one the Survey found in the San Manuel location.

Bear Creek's exploration was to determine depth and extent of post-ore cover over what was believed to be a favorable igneous host rock for copper mineralization. Drilling to a depth of 1,600 feet is reported to have shown about 600 feet of surface debris and caliche with the remainder of the hole being in igneous flow rocks.

ARIZONA

The Pumpelly Mining Industry is building a custom mill at Wickenburg, Arizona, designed especially to treat manganese ores from the Wickenburg area. The mill is located at the side of the old Vulture mill, about ¼-mile northwest of Wickenburg. When the plant is completed, the concern expects to purchase ores, but does not plan to engage in mining operations. Raphael Pumpelly of Malibu, California, is the owner of Pumpelly Mining Industry. Jack Sharp, who now operates an assay office in Wickenburg, Arizona, plans to join with the Pumpelly Mining Industry in establishing an ore market for the purchase of gold, silver, copper, and lead ores.

The Ducor Mining and Milling Company has made a small shipment of ore to the Iron King mill for test purposes. The Ducor organization is exploring and developing the old Poland mine, near Mayer, Arizona, and has cleared the Poland Tunnel to the Poland vein, unwatered a 300-foot winze for 100 feet, and done some drifting on the vein in both directions. The Poland was first worked in 1885 and was an intermittent producer from 1900 to 1912 with a 20-stamp mill. Some small gold production has been reported in more recent years. H. H. Records is general manager for Ducor, and Louis Dandrea is mine foreman. Eight men are employed.

The Bonanza mine, near Patagonia, Arizona, is limiting its production of copper ore to about 200 tons monthly, most of the ore being obtained from exploration and development work. The company is endeavoring to explore and develop an extension of the copper ore body which has been worked on the 235-foot level during the past few months. Underground diamond drilling is being conducted from the 235-foot level to prove additional ore reserves, and a drift has been started on the 335-foot level to under-cut the ore body worked on the 235 level. The Bonanza is owned by

Nash Mines and operated under lease by C. S. Elayer of Silver City, New Mexico. Paul L. Hunter of Patagonia, Arizona, is mine superintendent.

The Duval Sulphur and Potash Company is preparing to start the second set of two drill holes at the property of Coronado Mines, Inc., near Nogales, Arizona. The first two holes, drilled at an angle of about 45 or 50 degrees, are down to a depth of 1,250 and 1,400 feet respectively. Joy Manufacturing Company holds the contract for the diamond drilling. The Coronado holdings were optioned to Duval in the fall of 1953 and the first drill hole started November 25. See MINING WORLD, February 1954, page 95 for additional details.

The Illinois Zinc Company of Chicago, Illinois, has entered into an agreement for the purchase of the Shannon mine, one-fourth mile north of Gleason, Arizona. The Shannon consists of 9 patented claims held jointly by A. J. Hutchinson and K. C. Moon of Douglas, Arizona; Ira Van Tuyl, Evansville, Indiana; and J. D. Haynes, Odessa, Texas. According to Morris Blumberg, chairman of Illinois Zinc, the company's examination of the property indicates a substantial tonnage of high-grade lead and zinc ores, with some low-grade copper sulphide pyrite ores. When title to the mine is closed, Illinois Zinc plans to rehabilitate the property and its two shafts, one of which is down 600 feet and the other 400 feet, he said. At least 60 days' time will be required for preliminary work, after title acquisition, before mining will be started, Blumberg said. The Shannon, discovered in 1896, was an important copper producer in the early 1900s, most of the ore going to the Clifton smelter, and underground workings amounted to over 38,000 feet. In 1923 an unsuccessful attempt

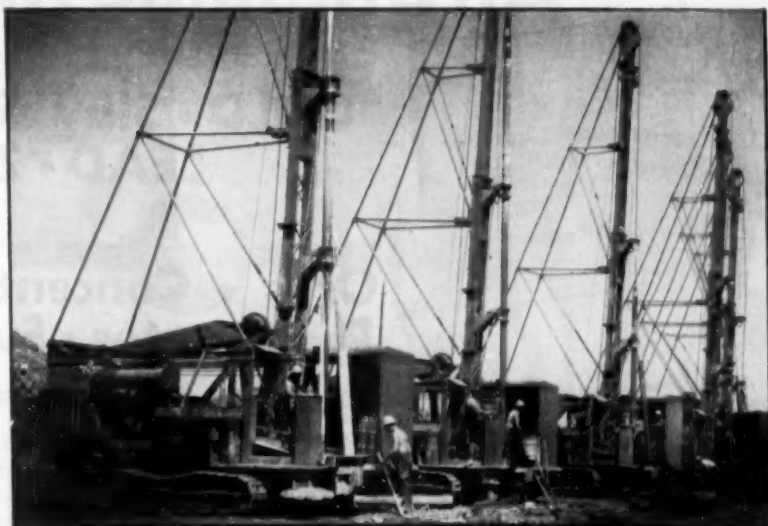
was made to extract the copper from mine ores by a unique method of roasting and leaching in place. Although the sulphide ore body burned satisfactorily for a few months, the fire gradually died down without accomplishing its purpose.



The Minerals Beneficiation Division of the American Institute of Mining & Metallurgical Engineers is planning its fall meeting in San Francisco, California on September 24 immediately following the close of the AMC convention. Technical sessions are scheduled for morning and afternoon, and a luncheon is planned. All will be held at the Fairmont Hotel. Because the meeting directly follows the exposition, milling men will have an excellent opportunity to see what is new in mining equipment, attend the AMC operating meetings, and then the informative session of the AIME.

The Great Western Consolidated Mining and Milling Company is reported to be constructing a mill to concentrate manganese ore by a dry process. The ore will come from the Logan manganese mine about 20 miles east of Newberry, California.

Clay-water systems will be the subject of the 1954 Pacific Coast Regional Conference on Clays and Clay Technology to be held on the Berkeley campus of the University of California June 25 and 26. Purpose of the conference is to provide an opportunity for those engaged in some phase



Spudding in at Eagle Mountain

The battery of churn drills pictured above is spudding in at the Eagle Mountain iron mine of the Kaiser Steel Corporation located in the Colorado Desert in southern California. Using a 9-inch hole, the drills are working at a rate of 34 feet in 3 to 4 hours. The Eagle Mountain operation is now producing all the blast furnace ore requirements for Kaiser's Fontana, California plant. Production is at the rate of more than 2,000,000 tons per year. Three orebodies are being mined at Eagle Mountain. The oldest, Bald Eagle, has produced 3,800,000 tons of ore since 1948. The other two, the North and South, have produced 2,000,000 tons in 16 months, averaging 54 percent Fe.

of fundamental studies of clay and clay technology to gather and share scientific and technologic knowledge and engineering experience. The general program arrangement is to present papers in the morning sessions and discussions in the afternoons. For further information write to the Department of Conferences and Special Activities, University Extension, University of California, Berkeley 4, California.



A high-grade ore body has been discovered on the 500-foot level in the old Bristol silver mine, owned by Bristol Silver Mines Company, at Pioche, Nevada. Don Warner who is operating a lease on the 500 level is credited with exposing the vein. An assay reportedly showed 19 ounces silver, 13 lead, 14 zinc, and 3 ounces copper. The Bristol is one of the older mines in the state, and has been in almost continuous operation since 1875. At present lessees operate part of the mine on a 50-50 basis.

The old Carrie lead-silver mine is being reactivated—this time as a tungsten producer. A partnership of Fred and Homer L. Gilbert of Mina, R. E. Williamson of Round Mountain, and the L & W Tungsten Company of Santa Monica, California, have set up head-

quarters at Tonopah, Nevada to operate the property. The mine itself is located 2½ miles north of Gilbert in Esmeralda County. Working by hand, the Gilbert brothers have driven short crosscuts off the 90-foot drift and have stockpiled about 100 tons of ore. L & W Tungsten will supply a bulldozer, compressor, trucks and other necessary machinery. If operations progress favorably, a 25-ton mill may be erected.

The Nevada Perlite Company expects to start mining ore from its perlite deposits 18 miles south of Fallon, Nevada very shortly. A long-time contract has been let to Robert N. Gillespie & Company for mining, hauling, and delivering into cars at rail points. The Gillespie company's first job is to build roads into the property from U.S. highway 95. Plans are to ship 500 tons or more daily until a processing plant three miles west of Fallon can be built. A. E. Hepburn is president of Nevada Perlite; N. M. Lassen is vice president and assistant manager. The perlite claims were purchased from William Stuart, and are said to contain several million tons of perlite.



A group of Albuquerque, New Mexico businessmen have organized the Canon-

cito Uranium Corporation to prospect on Indian lands 25 miles west of Albuquerque. A permit has been issued to the firm which plans to spend \$50,000 in prospecting over the 15,000-acre property. John Lynes is president.

At the potash property of International Minerals & Chemical Corporation near Carlsbad, New Mexico, all production crews on the sylvite level have been moved to the Southwest extension of the ore body and will now use No. 4 shaft. A development crew will continue working in Panel 1 with the continuous miner, and these men will continue to use the No. 2 shaft. All crews working on the 850-foot langbeinite level are also using No. 2 shaft and operations on that level will continue as in the past. Work in the Southwest area will be divided into two main areas. One group will work in 43 West and all adjacent territory, and also will be responsible for track and ventilation work in this section; another development crew in the 55 North and South section will also take care of the remaining track and ventilation on the 900-foot level.

Luck Mining and Construction Company has temporarily stopped shipping manganese-iron ore from its Boston Hill mine near Silver City, New Mexico to Pueblo, Colorado because of slackening demand for steel at the Colorado Fuel and Iron Company plant at Pueblo. CF&I, in turn, announced a layoff of 2,000 to 2,500 employees because of a drop in demand for steel. Luck company has been shipping ore to Pueblo since 1937.

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\$4,000,000 Uranium Mill Planned by New Moab Firm

A \$4,000,000 uranium processing mill will be built at Moab, Utah by a new corporation which has been formed by the Utex Exploration Company and Combined Metals Reduction Company of Salt Lake City. E. H. Snyder, president of Combined Metals, heads the new firm, Uranium Reduction Company.

Contract negotiations with the U. S. Atomic Energy Commission will start soon. Construction may begin this fall with completion of the mill tentatively set for early 1956. The entire output of Charles Steen's Mi Vida mine, which produced 10,000 tons of uranium ore in March, has been pledged to the mill. The mill also will serve other producers in southeastern Utah.

Officers of Uranium Reduction, besides Mr. Snyder, include Charles A. Steen, vice president, and O. F. Burton, secretary-treasurer.

Atlas Acquires Claims In Utah Uranium Fields

Atlas Corporation, New York investment firm, has entered the Utah uranium picture with the acquisition of a group of mining claims and options in San Juan County's Big Indian district and a plan to merge some of its claims with properties held by the Lisbon Uranium Corporation of Salt Lake City.

Atlas' Big Indian claims were purchased from Utah uranium man, Charles Steen, for Wasatch Corporation, an Atlas subsidiary, and San Diego Corporation and Airfleets, Inc., in both of which Atlas has minority interests.

The agreement with Lisbon calls for transfer of a majority of the Atlas claims, option to buy a group of the Steen claims, and approximately \$700,000 in cash to Lisbon. In return, the Atlas interests would receive 2,800,000 shares or two-thirds of the outstanding stock in Lisbon Uranium. The transaction is expected to enable Lisbon to make the first payment on the Steen options and to begin exploratory drilling immediately.

AEC Radioactivity Maps To Be Posted at Laramie

Index maps showing the location of surface areas of high radio-activity will be posted on the fifteenth day of each month at the Geological Survey Office, University of Wyoming, Laramie, Wyoming, the Grand Junction Operations office of the U. S. Atomic Energy Commission has announced. Addition of the Laramie, Wyoming, map brings to 12 the number of such maps being posted by the AEC in the Rocky Mountain area.

Locations of other maps, showing anomalous areas which have been detected by airborne instruments and geological reconnaissance on the ground are: Denver Exploration Branch, AEC, Denver Federal Center, Denver, Colorado; Hot Springs Suboffice, AEC, Hot Springs, South Dakota; Bureau of Mines Office, Rapid City, South Dakota; U. S. Geological Survey Office, Custer, South Dakota; Grand Junction Operations Office, AEC, Grand Junction, Colorado; Salt Lake Exploration Branch, AEC, Salt Lake City, Utah; Richfield Suboffice, AEC, Richfield, Utah; AEC Buying Station, Monticello, Utah; U. C. Geological Survey Office, Worland, Wyoming; U. S. Geological Survey Office, Caspar, Wyoming; Douglas Suboffice, AEC, Douglas, Wyoming, and Wyoming Geological Survey, University of Wyoming, Laramie, Wyoming.

cello, Utah; U. C. Geological Survey Office, Worland, Wyoming; U. S. Geological Survey Office, Caspar, Wyoming; Douglas Suboffice, AEC, Douglas, Wyoming, and Wyoming Geological Survey, University of Wyoming, Laramie, Wyoming.

Sprague & Henwood, Inc. Gets Drilling Contracts

Sprague & Henwood, Inc., Scranton, Pennsylvania, has been awarded two separate contracts by the United States Geological Survey for diamond drilling in the uranium fields of the Colorado Plateau area.

The firm, which maintains a branch office in Grand Junction, Colorado, will conduct a total of 120,000 linear feet of exploratory drilling in Colorado and Utah. One contract covers an extension of drilling at La Sal Creek Area No. 2, Montrose County, Colorado, and San Juan County, Utah, while the other contract is for additional exploratory drilling on the Gateway No. 2 Project in Mesa County, Colorado, and Grand County, Utah.

New AEC Uranium Find Reported in Bull Canyon

Uranium ores unofficially reported to be worth millions of dollars have been located by the U. S. Atomic Energy Commission on Monogram mesa in the Bull Canyon district of Montrose County, Colorado.

Most of the large mining companies on the plateau reportedly are seeking to negotiate for leases on the property. According to AEC officials, it will be "two or three months yet before we decide what we are going to do with the properties."

The ores are in the Morrison formation and are of carnotite type. They contain some uraninite and vanadium and are in a slump area which is badly faulted, according to the AEC. The discoveries are near the Jo Dandy group of mines which have been the most productive in the Bull Canyon district.

course will be held in the Aspen Colorado district. Further information may be obtained by writing to the school.

Thirty-two location certificates for uranium claims were filed recently in Mesa County, Colorado. One of the certificates, filed by Raymond Foster, W. F. Devenney, and Lee Wise, covered 12 claims in the Gateway mining district. Ray Lewis also filed 12 claims in the Gateway area.

A 60 percent increase in earnings during 1953 has been announced by the *Climax Molybdenum Company*, New York City, in its annual report. Total earnings for the year, after charges and taxes, were \$9,717,000. Production, up 56 percent, was 37,306,341 pounds of molybdenum. The report also placed the earnings of the subsidiary, *Climax Uranium Company* at \$428,248 for the period from June through December 1953.

Among the new mining companies formed in Colorado recently are the following (all with "uranium" in their names): *Crescent Uranium Corporation*, incorporated by Hover T. Lentz, Arthur K. Underwood, Jr., and Michael Reidy, with Lucien H. Cullen, R. E. Neher, and W. W. Fenniken as directors, with a capitalization of \$50,000; *Platora Uranium Corporation*, incorporated by Arthur N. Sweet, Jack M. Anderson, and Irving Lindner, with a capitalization of \$1,000,000; *Doyle Uranium Corporation*, incorporated by E. G. Untiedt, J. Darrel Stone, and Ross E. Knickerbocker; *Mountain States Uranium, Inc.*, Harvey W. Zook, Peter Nelson, and Hames R. Manning with a capitalization of \$600,000; *Bridger-Jack, Inc.*, incorporators and directors, Lawrence Filener, Garth Thornburg, Vance Thornburg, and Arthur M. Kirkendall, capitalization of \$250,000.



Shaft sinking is being completed and uranium ore production has begun on the properties of the *Continental Uranium Company* of Grand Junction, Colorado. The properties are located in the Big Indian district of San Juan County, Utah.

Drilling by the *Minerals Engineering Company* of Grand Junction, Colorado has already begun on the 176-acre Patterson ranch, in the Big Indian district of Utah's San Juan County, which was recently purchased by the *Tintic Standard Mining Company*. Mineral rights on the property are held by *Tintic, Utex Oil Company*, and individual Salt Lake City and Texas interests.

Zinc-lead-silver ore exploration in the Eureka district of Utah will soon be started by *E. J. Longyear and Company*. The operation, mainly diamond core drilling, will be the initial program of a "unit" lease in which Longyear, *Tintic Standard Mining Company*, *United States Smelting, Refining and Mining Company*, and *Chief Consolidated Mining Company*, among others, are pooling their interests and claims. The group is conducting a combined operation on 2,700 acres in the Eureka district, it was disclosed by Cecil Fitch, Sr., president of Chief Consolidated Mining Company.



Development work will soon begin on an uranium property 12 miles northwest of Durango, Colorado, which was leased last month to the *San Juan Mining Corporation*, Oklahoma City, Oklahoma. R. B. Walter, president of the firm, expects to be producing 100 tons of uranium ore a day by the end of the year. The ore body is a blanket-type deposit of roscolite, containing both uranium and vanadium. Located on Lightner Creek, it was discovered by two Durango prospectors, Adolphus S. Butell and Frank W. Pinkerton.

Colorado's Supreme Court has made its first ruling on uranium mining leases by upholding *Climax Uranium Company's* rights in uranium mining claims against contentions of W. R. Nichols.

Colorado School of Mines, Golden, Colorado, has announced a summer field course in mining geology. The six-week

U. & I. Uranium, Inc., and Resource Engineering, Inc. have been formed by Lester Harrison, Kellogg attorney, and associates, to carry out exploration work for six Kellogg mining companies in Utah. Holdings include the Hot Rock and Radon groups in the La Sal area and the newly staked 20-claim Rocket group 15 miles west of Moab. The associated firms are Signal, Nancy Lee, New Era, Silver Bowl, Caledonia Silver-Lead, and Coeur d'Alene Silver Giant mining companies.

The V-T Drilling Company is drilling 12,500 feet of hole on the Suede claims controlled by the Federal Uranium Corporation in the Big Indian district on San Juan County, Utah. If sufficient quantities of ore are located, a new company will be formed to undertake development. V-T Drilling, Federal Uranium, and Paul T. Walton, Salt Lake City geologist, will have substantial interests in the new firm.

A seven-man committee was delegated to draft by-laws and a program for the Utah Uranium Miners Protective Association by more than the 100 miners and prospectors who attended the preliminary meeting in Moab, Utah. Merritt Rud-dock, vice president of Cal Uranium Company, was named chairman of the special committee. Serving with him are Mitchell Melick, Reed Reynolds, Howard Balsley, Richard Mohler, Jack Riley, C. S. Thomson, and Owen Malin. The group's main purpose is to protect uranium prospectors and miners from claim jumpers.

Growing shipments of concentrates and ores are being made to the Salt Lake Tungsten Company in Salt Lake City, Utah. Soon to be added to the list is the Art Williams mill in the House Mountain area. Combined Metals Reduction Company mills also may begin shipment. Salt Lake Tungsten, which is jointly owned by Minerals Engineering Company of Grand Junction, Colorado, and Sylvania Electric Products Corporation, is operating at two-thirds capacity, according to Blair Burwell, Jr., superintendent. This rate varies with grade of concentrate received at the refinery. Shipments are currently being received from Minerals Engineering's Glen, Montana mill, the H. M. and S. Milling Company in Salt Lake City, and the Baltimore-Camas mill at Ely, Nevada.

The Canadian firm, National Explorations, Ltd. has acquired a uranium prospect near Moab, Utah. Previous to filing 10 claims on the Colorado Plateau, the company had concentrated its activities in the Beaverlodge area in northern Saskatchewan, Canada.



A new oil-shale retorting method is being developed at the Petroleum and Oil-Shale Experiment Station, Laramie, Wyoming. The operation consists essentially of entraining small particle-size shale in a gaseous medium and flowing the mixture through a horizontal tube in a gas-fired furnace; and then separating the spent shale from the oil and gas that are formed. It has been found that high-quality oils can be produced at rapid re-

torting rates. Also, products having potential value as chemical raw materials have been obtained—sulfur, ammonia, ethylene, butadiene, pentadiene, cyclopentadiene, benzene, toluene, and naphthalene.

Wyoming and Utah iron ore mines supplying Colorado Fuel and Iron Corporation steel mills in Pueblo, Colorado, resumed operations late in April after a two-month shutdown.

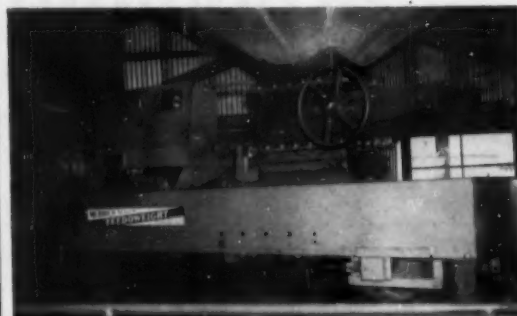
Thirteen uranium claims, on Beaver Creek in Big Horn County, Wyoming, have been filed at the county clerk's office in Basin. Filing claim rights on the syncline formation were J. P. Rohan, A. B. Cofeen, and E. D. Berry, all of Greybull, Wyoming.

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American Zinc, Lead & Smelting Co.	42	General Electric Company, International		Precision Radiolium Instruments	80
Anacosta Wire & Cable Co.	33	(World Mining Only)		Pressed Steel Car Co.	WM 76
Atkinson, Guy F.	99	Goodall Brothers 97		(World Mining Only)	
Atlas Powder Co.	34	Grossberg Machine Co.	78	Price, Franklin L. C.	97
Arizona Testing Laboratories	97				
		Hanks, Inc., Abbott A.	97	Resisto-Loy Co.	84
Barber Greens Co.	84	Hardings Co.	73	Ruderman Machinery Exchange	99
Barrett, Bob 84		Harnischfeger Corp.	99		
Bemis Bros. Bay Co.	82	Hawley & Hawley 97		Salem Tool Co.	3
Bick & Deason 97				Scandinavian Ore Tankers, Inc.	97
Boyles Bros. Drilling Co.	90	Indiana Foundry Co.	96	Simplex Wire & Cable Co.	66
Boyles Bros. Drilling Co., Ltd.	WM 28	International Combustion, Ltd.	21	Sintering Machinery Co.	74, 100
(World Mining Only)		International Smelting & Refining Co.	43	Smith-Emery Co.	97
Buckman Laboratories	99	Joffrey Manufacturing Co.	7	Sprague & Henwood Co.	78
Bucyrus-Erie Co.	11	Johnson, Herbert Banks 84		Standard Oil Co.	97
Bunker Hill & Sulphur Mining & Concentrating Co.	42	Jay Manufacturing Co.	35	California 29	
Business Men's Clearing House 100		Keagel, C. F.	97	Still, Arthur R.	97
		Kelly, John E.	97	Sturtevant Mill Co.	WM 25
		Kirk Co., Wallace E.	99	(World Mining Only)	
				Syntron Co.	92
		Loyander, Philip A.	97		
		Lodson Mfg. Co.	92	Torry, Joseph 99	
		Lodoux & Co.	97	Thermo-Rubber Co.	12
		LoRei Co.	4, 5	Thor PowerTool Co.	11
		Lochran Wire Rope Div., H. K. Porter Co.	98	(World Mining Only)	
		Loxton Corp.	WM 80	Timken Roller Bearing Co.	36
		Link-Belt Co.	81	Traylor Eng. & Mfg. Co.	17
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		Lundberg Explorations, Ltd.	84	Udy, Marvin J.	99
				Union Carbide 32	
				U. S. Steel Co.	37
				Van Waters & Rodgers, Inc.	97
				Walveard Co., O. W.	97
				Wedge Wire Corp.	84
				Western Machinery Co.	23
				Westinghouse Electric, International	12
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				Outside Back Cover	
				Wilfay, Clifford R.	97
				Wilson, Glenn B.	98
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